NATIONAL AIR-CRAFT SHOW NUMBER

AVIATION

The Oldest American Aeronautical Magazine

A McGraw-Hill Publication

APRIL, 1931

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AVIATION

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The Oldest American Aeronautical Magazine

EDWARD P. WARNER, *Editor*

LOUIS F. STOLL, *Publishing Director*

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CONTENTS FOR APRIL, 1931

Volume 30, Number 4

The National Aircraft Show of 1931 210
An analyses of the scheduled exhibits—a show directory, a map of the exhibition hall, and a program of events — BY JOHN T. NEVILL

A Pre-View of the Detroit Show 213
Brief summaries of the aircraft, engine, and accessory exhibits as planned for the 1931 show

Contract Air Mail's Future 218
An interview with W. Irving Glover in which he clearly interprets his stand in regard to air mail and transport

The Show from the Sales Managers' Viewpoint 220
A symposium on the conduct of aeronautical exhibits by some thirty leaders in the sales field

Touring Europe by Private Plane 232
Some interesting comment on Mr. Manning's recent tour and some advice to the prospective private-plane tourist — BY LEROY MANNING

The Aeronautical Chamber Carries On 236
A summary of the achievements of the chamber and an analyses of its organization and functions

Servicing Aircraft Instruments 239
Methods and procedure for the checking and maintenance of the more commonly used instruments — BY GEORGE TATE, JR.

The Airline Attendant's Job 244
What are the qualifications for an airline attendant and what services does he render? — BY C. B. ALLEN

EDITORIALS 197

NEWS OF THE MONTH 201
STATISTICS OF THE MONTH 208
TRANSPORT AND ENGINEERING 246
FLYING EQUIPMENT 248
WHAT OUR READERS SAY 253
NEW VOLUMES FOR THE SHELVES 254
SERVICING SHORT CUTS 256
TECHNICAL ABSTRACTS 257
THE BUYER'S LOG BOOK 258
SIDE SLIPS 260

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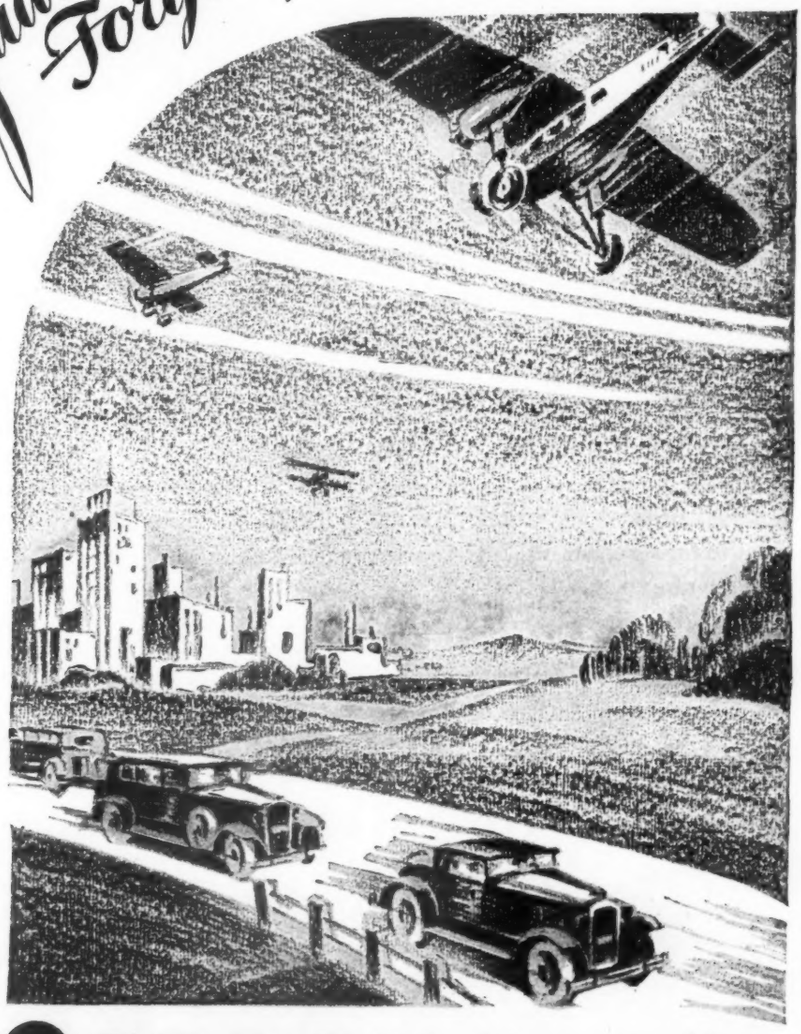

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COMPARE the many wonderful features of the new Fairchild F-8 aerial camera with your own specifications. See how completely they are filled. It is truly a universal camera embodying every desirable feature.

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Another entirely new feature of the F-8 is the easy, convenient method of changing the focus of the lens. This can be accomplished without removing the camera from the operating position as the control is accessible and the scale fully visible.

Above all the new camera is a Fairchild product, which means such Fairchild features as precision manufacture, rugged all-metal construction, and interchangeable parts.

The same genius . . . the same skill that have made Fairchild military type aerial cameras the standard of the world are responsible for the F-8. Here it is—the instrument for which aircraft operators, sportsmen flyers, aerial photographers, newspapers, commercial photographers and all those interested in photography from the air have been waiting. And the price is only $550.00.

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Never Before Has An Aerial Camera Embodied All 25 of These Great Features

5 x 7 Negative Size—*large enough for desired ground coverage—small enough for a light-weight camera.*

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Cut Film, Roll Film or Plates *on any F-8 Camera—cut film or plate magazines instantly attachable.*

Size and Weight *minimum for a camera taking 5 x 7 photographs—largest section 9¼ x 10½ inches and height 14 inches—weight 15 pounds.*

Focus of Lens *adjustable from operating position as control is accessible and scale visible—not necessary to look into lens end of camera to focus—focus from 8 feet to infinity.*

Iris Diaphragm *adjustable*

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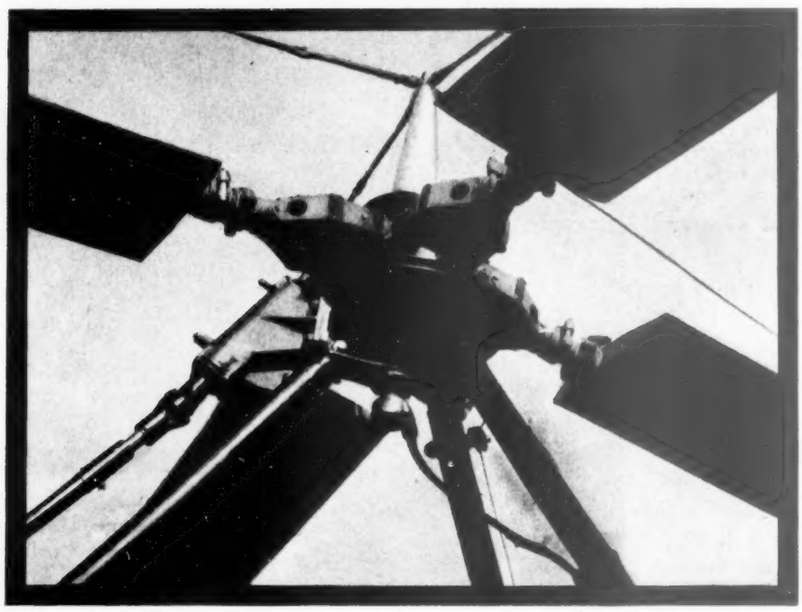
FAIRCHILD AERIAL CAMERAS

SUMMERILL ACCURACY Gives AUTOGIRO'S Rotor *PERFECT BALANCE . . .*



Closeup Showing Autogiro Rotor

The chief structural element of the Autogiro Rotor Blade is the tubular backbones upon which it is built. This tube must have high physical properties as it is constantly subjected to high tensile loads.

After a year of difficulties with the wide tolerances and weight variations of Air Service tubing, a new specification was drawn up by the Autogiro Company of America which exceeded all of the Air Service tolerances as to straightness, eccentricity, ovality, and variation of outside diameter—together with a special limit of 2% variation in weight (for purpose of balance in the rotor).

The SUMMERILL TUBING COMPANY has met these rigid specifications to the satisfaction of the Autogiro Company of America, and so, have rendered possible the obtainment of balanced Rotor Blade tubes for all manufacturers of Rotor Blades under license with the Autogiro Company of America.

Autogiro Climbing Out of Park

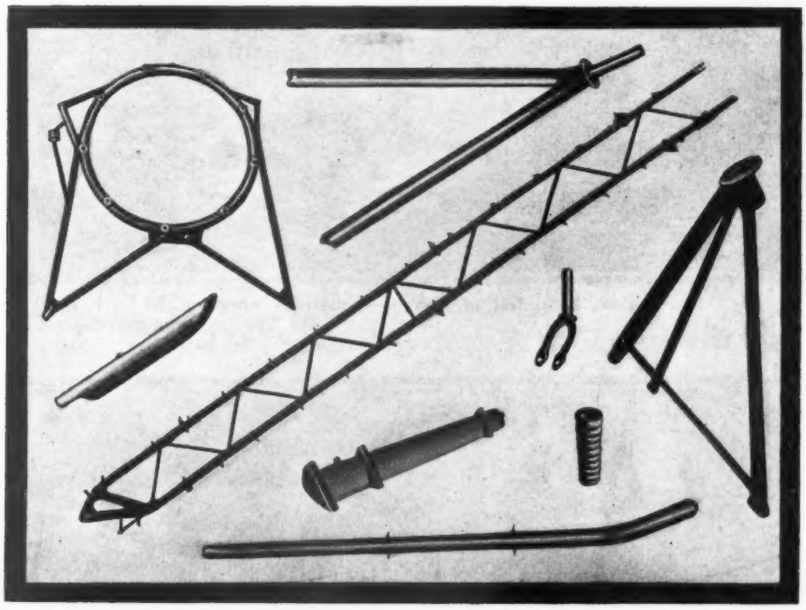
SUMMERILL TUBING COMPANY

BRIDGEPORT (PHILA. DIST.) PA.

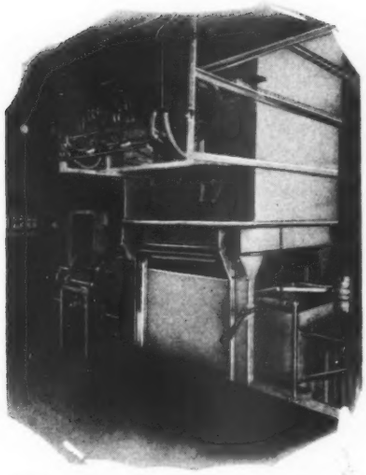
THE STRENGTH OF THE PLANE IS SUMMERILL TUBING

TUBING by SUMMERILL

SUMMERILL TUBING
STRENGTHENED by
METLAB



Aircraft Parts Made By Metlab



Vertical Electric Heat Treating Furnace

METLAB FABRICATING AND HEAT TREATING SERVICE provides finished parts or tubing embodying the utmost in strength, lightness, reliability, and economy. Metlab shops are personally supervised by prominent metallurgical, aeronautical, and production engineers. Metlab engineering aids the development of safer and more economical aircraft. Autogiro Rotor Blade Tubes are heat treated by us. Summerill and Metlab together provide a complete service from raw material to finished part.

Consult with us. We shall be glad to cooperate with you on your fabricating and heat-treating problems.

SEE THE METLAB AND SUMMERILL TUBING COMPANY'S EXHIBITS AT THE NATIONAL AIRCRAFT SHOW, DETROIT

METALLURGICAL LABORATORIES, INC.
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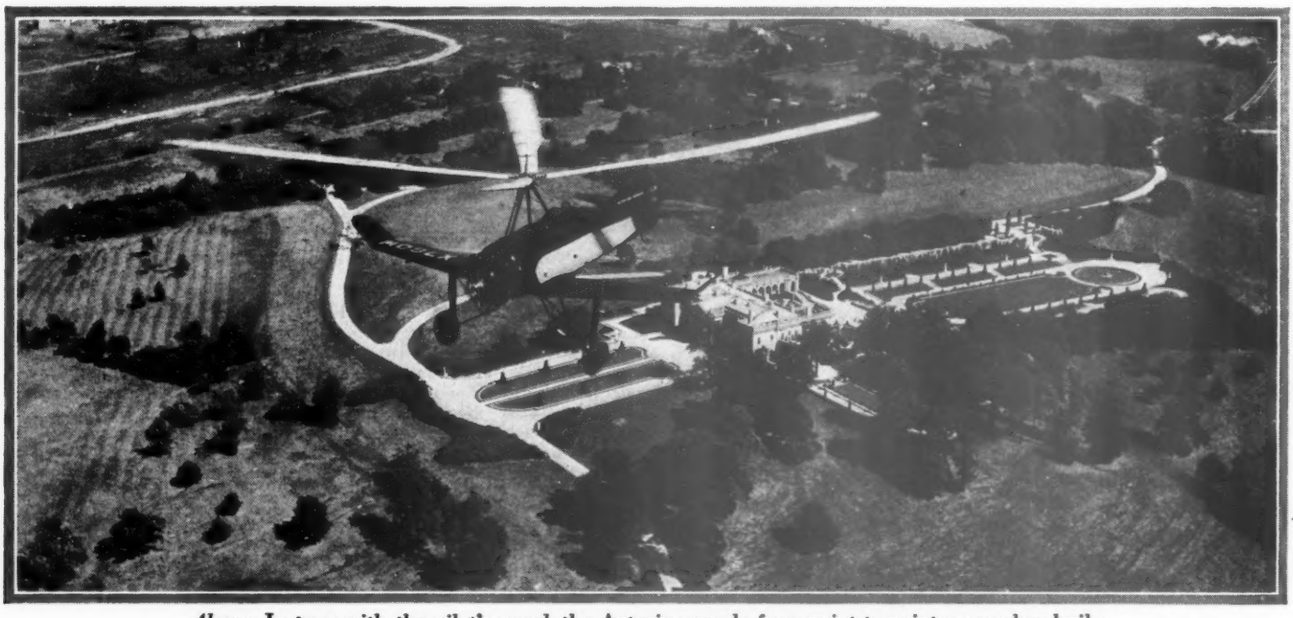
THE STRENGTH OF THE PLANE IS SUMMERILL TUBING

HEAT TREATED BY
METLAB

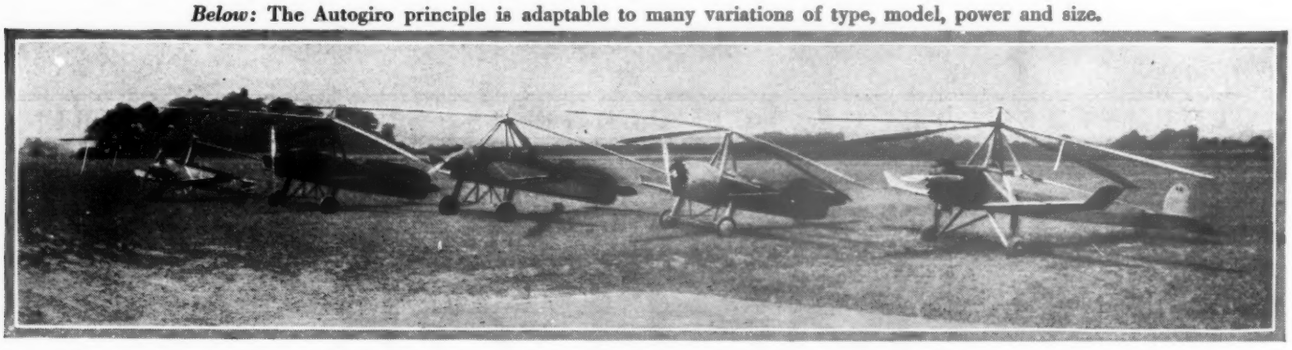
*ONE OF A SERIES OF ADVERTISEMENTS BASED ON STATEMENTS

Low, high, fast or slow — —situations which might be critical for the conventional airplane give the Autogiro pilot no concern.



Above: **In tune with the pilot's mood, the Autogiro speeds from point to point or wanders lazily along, always able to land in any small, open space.**

Below: **The Autogiro principle is adaptable to many variations of type, model, power and size.**



AUTOGIRO COMPANY OF AMERICA

BY RECOGNIZED AVIATION AUTHORITIES—NAMES ON REQUEST

"Make it less necessary for the pilot to do the right thing" *

IT has been estimated that security in the conventional airplane of today is 90 percent dependent upon piloting skill. "*. . . personal safety is governed, in the Autogiro, in ratio of about 10 percent piloting skill and 90 percent inherent aerodynamic stability.*" *

The layman has come to believe that learning to pilot an airplane is a long and tedious process . . . "*After a very little dual instruction, and that of the most elementary nature, a student can be allowed to learn the finer points of maneuvering the Autogiro by himself.*" *

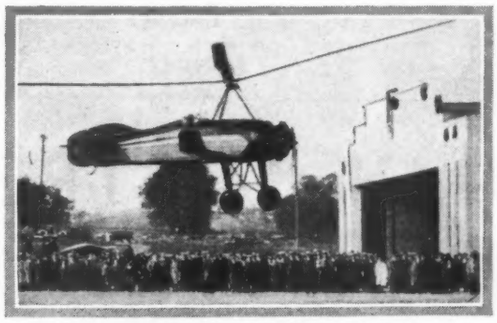
Relatively few persons have the natural aptitude necessary to become competent pilots of the conventional airplane. "*. . . a novice . . . in the case of an Autogiro . . . is placed in much the same position as when learning to drive a motor car.*" *

Widespread development of the potentially great private market for aircraft can come only when the private pilot of moderate ability can fly with the same confidence and sense of security with which he drives his car . . . "*The safety of the rotating-wing craft is about as high as can be hoped for in any field of mechanical transport.*" *

The Autogiro Company of America is not a manufacturing or selling company. It is solely an engineering and licensing organization. It owns and controls, exclusively, all Autogiro patent rights in the United States. Manufacturing companies of high standing will be licensed to build Autogiros with the full co-operation of our engineering staff. We are now prepared to arrange demonstrations to acquaint the industry with Autogiro principle, design and operation, and to discuss production privileges.

CHARACTERISTICS

The Autogiro differs basically from all other heavier-than-air craft in the source of its lifting capacity. This lift is given primarily by four rotating blades which take the place of the familiar wings of an airplane. There is no time when this supporting rotation of the blades can be stopped while the machine is in the air, as their motion is produced solely by wind pressure caused by the movement of the Autogiro in any direction, climbing, level flight, gliding or descending vertically. The supporting rotation of the blades is entirely independent of the engine, whose sole function is to propel the Autogiro.



At Curtiss-Wright Airport, Baltimore. Interest in the Autogiro grows apace.

The Autogiro presents flying characteristics hitherto impossible. It can take off at low speed after a very short run, and immediately assume a steep-climbing angle. It can fly well over 100 miles per hour, or as slowly as 25 miles per hour. It can be brought momentarily to a standstill and hover. It can bank and turn slowly without fear of loss of forward speed. It can glide or descend vertically at a speed less than that of a man descending in a parachute, and with virtually no forward speed even with a dead engine. Above all, it cannot fall off into a spin from a stall. As a result, little operating skill is required.

AUTOGIRO

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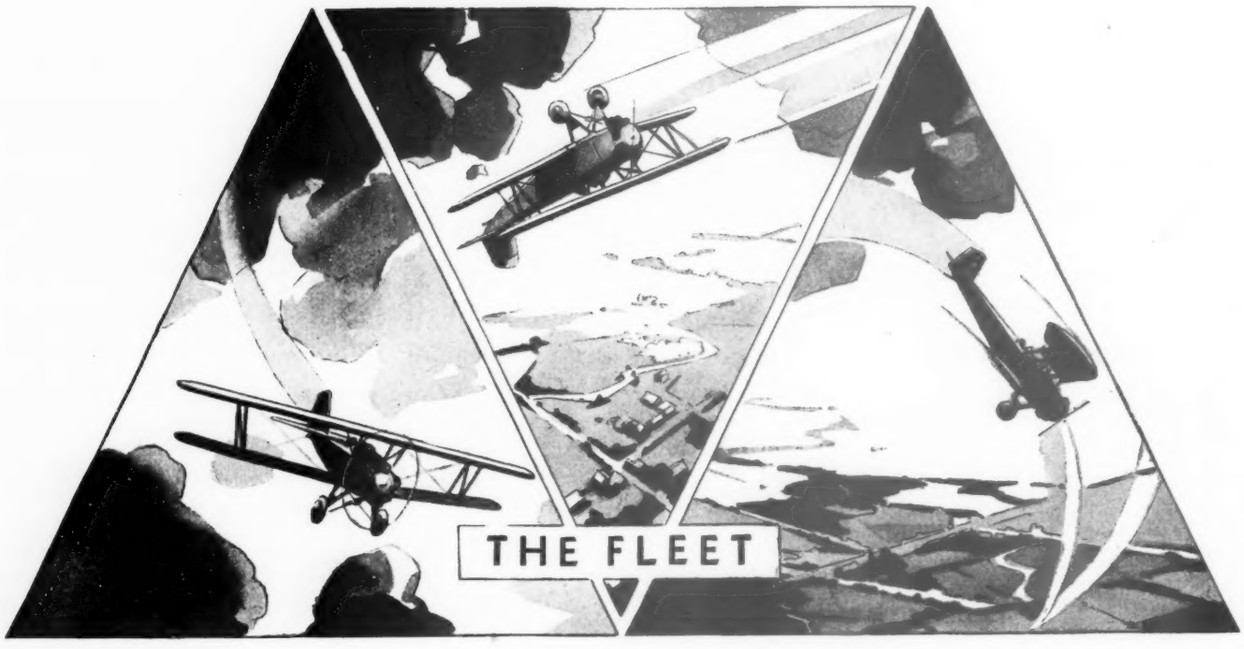
The unparalleled performance inherent in every FLEET was dramatically demonstrated by "Olie" Olson, of the Standard Flying Schools, Los Angeles, Cal., in executing the most difficult and dangerous of flying feats—*the inverted falling leaf*. This daring pilot descended 2,500 feet in a series of zigzag side-slips, dropping about 500 feet each time, *with The FLEET upside down, and the power off*...Startling and convincing proof of The FLEET'S instant response and controllability. Olson says: "Its maneuverability, visibility, sturdiness and adaptability for general training purposes, make The FLEET an outstanding plane for student instruction."

PERFORMANCE



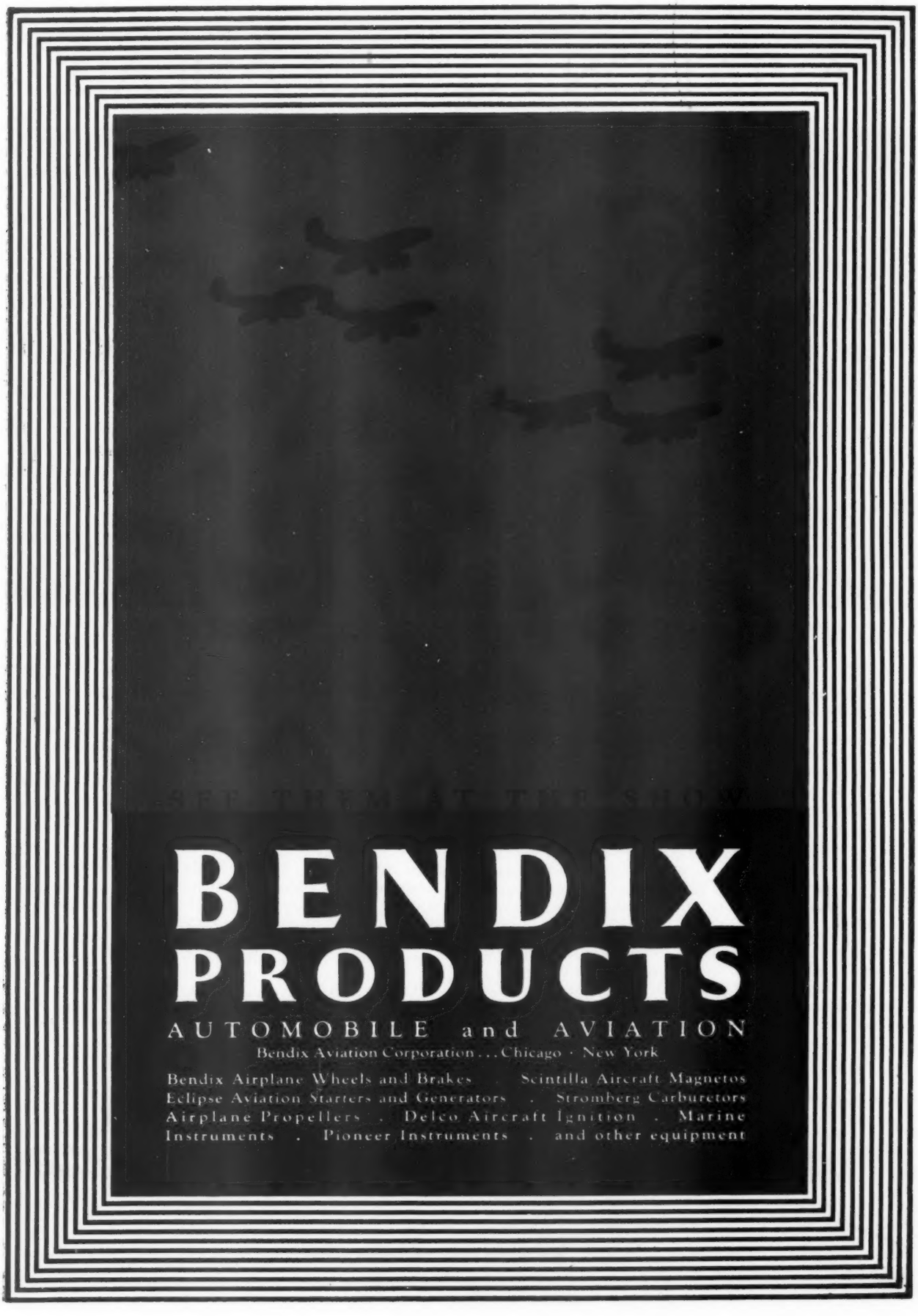
ECONOMY

After replacing higher-powered and more expensive planes with FLEETS, President D. J. Barrett, Jr., of the Westchester Airport Corporation, wrote: *"Our student's instruction income for this month will exceed last month's by a full 150%... Students enthusiastic about its performance and ease of handling have become great boosters for The FLEET, and for our school."* The FLEET'S economy and popularity are known wherever planes are flown. Profit records, as a result of its low air-hour maintenance cost, have made The FLEET the choice of the majority of independent school operators ● The FLEET'S performance and economy, demonstrated at the school, are of equal importance to the private owner.

STRENGTH

The world's record of 46 outside loops was made by Paul Mantz, of Palo Alto, Cal., in a stock FLEET... positive proof of its superb maneuverability and rugged strength. Under every known adverse stress, with a speed of 250 miles an hour on each dive, and exerting a centrifugal force at the bottom of each loop resulting in enormous pressures on the entire structure... for 3 hours and 45 minutes... The FLEET demonstrated its phenomenal stamina ● The strength of The FLEET is in its design and construction. It is built to withstand strenuous service—to out-perform and out-maneuver more costly planes of higher power. Its strength insures its durability—an important feature of its inherent economy.

FLEET AIRCRAFT INC. • BUFFALO, NEW YORK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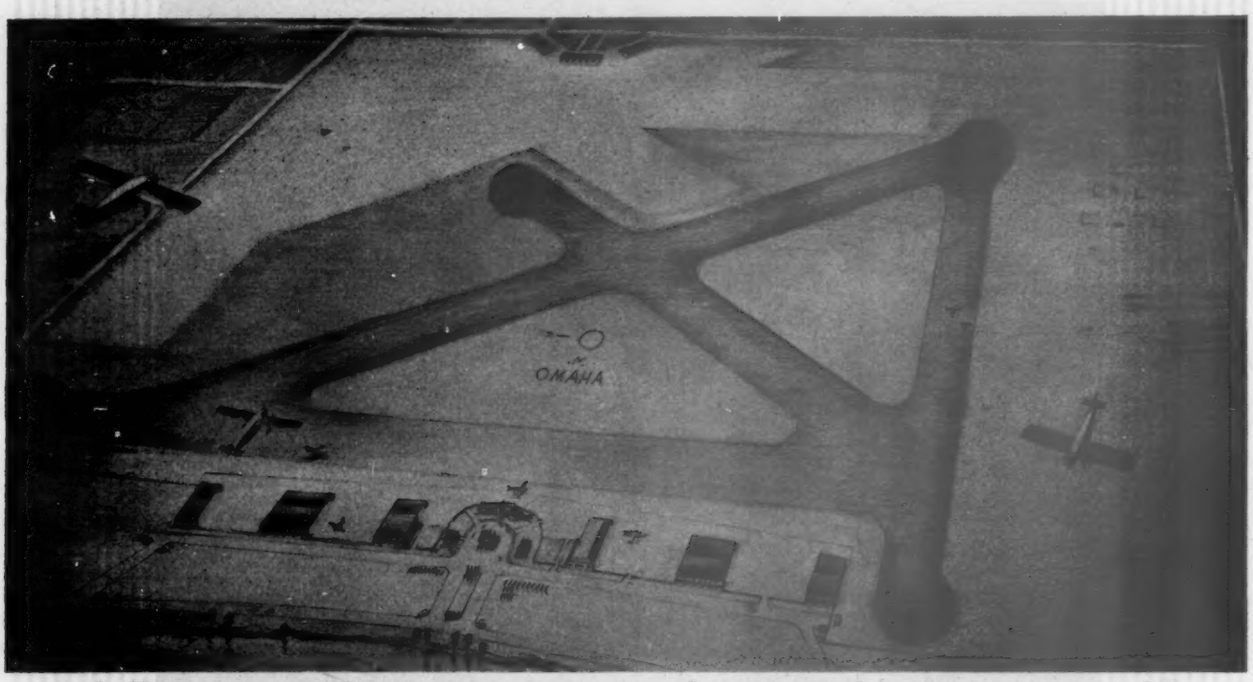
BUSINESS CYCLES NOT WITHSTANDING

AVIATION FORGES AHEAD



Omaha Municipal Airport, Omaha, Neb. Survey, report and complete engineering for entire airport project including layout and design of runways and the design and construction of hangars and other buildings by The Austin Company.

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Position..... Firm..... City..... A-4-31

AVIATION
A McGRAW-HILL PUBLICATION . . . EST. 1916

The Oldest American Aeronautical Magazine

EDWARD P. WARNER, *Editor*

VOLUME 30 . . . *April, 1931* . . . NUMBER 4

FOR INDUSTRY, A COMPASS AND A CHART

THE personnel of the aircraft industry are in the habit of thinking of themselves as a special case, to which no previous experience applies. Many of them men whose business life has been limited to the aeronautical field, and who are still under the spell of the spectacular and violent changes of the last thirteen years, they feel themselves to be apart from the general body of industrial history.

That has been one of the troubles of the last year. We have had an exaggerated idea of the peculiarities of our own position. We have underestimated the extent to which we are controlled by the same economic laws operating upon every industrial activity, from the making of perambulators to the cutting of tombstones. The course of general business in the past year has been nothing to which to point with pride, and it has afforded no precedent which we shall seek to follow in the future, but it has plenty of lessons to teach, and they are just as badly needed in the aircraft industry as anywhere else. The fact that we have troubles peculiar to ourselves and that there would have been some depression in aeronautical undertakings even if there had been none in the general business world, does not make it any the less desirable for us to learn all that we can from observing the pangs of the other victims of the case of economic colic which has afflicted the whole civilized world during 1930.

We have been having business cycles, with periodic booms and periodic depressions, for two centuries, but there is nothing to be said for the tradition of having them except that it is a venerable one. *There is no excuse for violent business cycles.* We have been resigning ourselves to them as though they were as inevitable as the rising and falling of tides, and as inscrutable and as remote from our control as the motions of the heavenly bodies, quite long enough. They represent nothing but a break-down of human intelligence and a mass abnegation of common sense,—and what the breakdown of intelligence can cause, the application of intelligence can cure.

To the prevention of future depressions the McGraw-Hill Publishing Company, publishers of AVIATION and of some thirty other business magazines, has made its contribution in the preparation of the Platform for American Business, enclosed as a supplement with this issue of AVIATION. The content of the platform is not the result of a snap decision, nor is it the opinion of any single individual. It is the product of profound consideration and debate by students of and workers in many branches of industry and economic science. Their conclusions have been checked by submission to business leaders of even more varied specialized interests and practical experience.

The Platform for Business is the result. It has been generously applauded by those who have examined it prior to general distribution. It deserves careful and thoughtful study by the aircraft industry. There are some points in the platform that do not apply to our immediate case, but there are others that we should take very much to heart.

Particularly pertinent is the recommendation for a

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regular program of research, addressed both to the development of a better product and to a better knowledge of the available markets. In a time of depression stringent economy becomes necessary, but that is the very time when we can least afford to slow down on research effort and expenditure. The suggestion that such expenditure be treated as a capital outlay devoted to the development of lasting assets, not as a charge against current income, has special merit.

The recommendation of long-time planning might be addressed specifically to the aeronautical world. To be sure, we shall have to adopt our own definition of "long-time." We may be limited to an outlook of one or two years in our detailed plan, while other industries longer established are looking ahead for three or five, but we should strain our vision to look ahead as far as possible. The unhappy experiences of a year ago have disposed the industry to take things as they come from day to day and to get along without forecasting. Admittedly, it is no easy matter to plan now for the position of the aircraft industry in 1932. Admittedly, it is necessary to keep production schedules and other arrangements flexible in the extreme, but the plan and the schedule should be there as a basis on which to build. The second of the general objectives of the Business Platform is an absolute essential for the future health of the aircraft business.

The fourth of the general objectives relates to the relation of industry with government. For us, that is a delicate subject. We have peculiarly close and friendly relations, both administrative and fiscal, with the federal government. Nevertheless, commercial aviation must make steady progress towards independence. The general conclusion that "American business should encourage self-government" is just as true for our business as for any other.

So far as the aircraft business possesses eccentricities as a business, we are unfortunate. Most of the peculiarities in our economic situation have had results at least temporarily unhappy. We shall gain stability and prosperity, and regain confidence in ourselves, in proportion as we set ourselves on the same footing with other industries, and operate in the same fashion that they have found successful. The Platform for American Business helps to point the way.

DETROIT, 1931

FOR the first time in several years the industry is in the happy position of being able to focus its attention upon a single show. Last year there were loyal partisans of Detroit who stayed away from St. Louis, and there were enthusiasts for the New York market who ignored Detroit. This spring there is no opportunity for differences of opinion. Everyone who wants to display his wares in the industry will come to the same market-place.

The show promises to be more sober and business-like than any of its predecessors. Certainly the available space has been taken, almost without exception, by solid and stable corporations. The irresponsible exhibitor fluttering on the brink of extinction, often prominent in the past, will be conspicuously absent.

It is particularly fortunate that it should be so, for there are a number of novelties in our situation as 1931 opens. There are a number of unanswered questions, and the answers can best be provided at a general assembly. There are various possibilities that are still speculative as AVIATION goes to press, but will be much less so the last of April. Events in and around the municipal hangar at the Detroit City Airport are going to be an exceptionally sensitive barometer of public opinion.

For example, the light planes will meet their broadest and severest test. Last year the few machines of that type that were shown attracted an immense amount of interest, but their very novelty made them a seven-days' wonder and militated against any fair judgment of their lasting qualities in the industry or their usefulness and appeal to the public. The somewhat impractical observation "Ain't it cute?", or its equivalent, was heard with disconcerting frequency among the crowds that milled around any of the pioneer light planes.

All that has changed now. Light planes of several different makes have been out in the field long enough for the novelty to wear off. The first flush of enthusiasm for innovation for its own sake has passed. Not only the dealers, but the potential retail customers, have had a chance to look the machine over. *Bona fide* light plane orders placed at the show by well-established distributors should represent not merely somebody's guess, but a definite knowledge of a public demand that has been definitely found to exist.

Another novelty at least as important will make its first commercial bow this month. For the first time in the United States an autogiro will be among the exhibits at a show. The type has attracted an immense amount of interest, both from the public and from the aeronautical specialists, wherever it has been demonstrated. Now we shall begin to see how that interest crystallizes in commercial form, and to what extent the autogiro finds customers among people who had never thought of themselves as possible owners of aircraft.

The period is a particularly critical one. The licensing figures for the first two months of the year have been disappointing, but it is too early in the spring for them to mean much. We shall really know where we stand and be able to draw definite conclusions a month from now. We shall learn a great deal during the Detroit Show about the relative accuracy of two schools of opinion that have competed for favor in the industry.

On the one hand there have been those who believe that the set-back in airplane production and sales has

been simply a part of the general world-wide depression. They presume that with the return of a bull market the airplane production curve will return to the line established from 1927 to 1929. The other group hold that we must face the fact that the market has been oversold, and that fundamental changes are needed in our product before we shall have a universal market and reach that mass production that two years ago seemed to be just around the corner.

We have made our own position clear on a number of occasions, but the time is near at hand when opinions, however carefully considered, can be superseded by facts. Within the next few months we shall *know* whether or not the airplane market is going to come back in substantial parallel with the automobile market. Upon that score, too, a great deal can be gleaned at Detroit by those who keep their eyes and ears open and who consider the show not as a convivial occasion but as one of the most serious and important events in their business year.

AIRPORTS NEED BUSES

A VISITOR from a neighboring planet touring American airports would be likely to conclude that many of them were being operated with the joint object of subsidizing the taxicab business and encouraging pedestrianism. Airports, otherwise first-class, still lack adequate ground transportation facilities for airline patrons. Some of them still lack approaches fit to be navigated by anything except a caterpillar tractor. Most of them offer no rapid transit facilities whatever for the general public. Inevitably, they have been established in open country where there has been no previous call for the establishment of transportation systems. Even where a field is located directly on or near a railroad it is usually impracticable to arrange rail service unless there be a direct co-operation with the railroad like that of T. A. T. at Port Columbus.

Bus lines, however, usually approach airports if they do not actually operate past them on the highway. In any case the buses are small units which operate at frequent intervals and on routes which are subject to change without great difficulty. Most of the country's large airports could be regularly served with a frequent schedule by established bus lines. The route changes or extensions necessary would add little expense to the bus operators, yet would have a salutory effect in popularizing airports and air travel and thus in building up traffic over the bus lines serving airports.

The job of obtaining adequate bus service for our airports rests with the aviation industry. Bus line operators are occupied with many problems and will not normally make any route extensions or schedule changes unless persuaded by the parties most directly interested. A campaign directed at the bus operators by leading aviation interests should bring much needed transit facilities to many of our airports not now served. Even if there should be a temporary deficit in the operation, it would be well worth the while of the airport management to subsidize the service. Economy is a great need of the hour, but there is no profit for anyone in making it difficult for people to reach an airport already built and operating. The theory that all patrons of aviation travel in their own automobiles is a pleasing one, but it does not square with the facts. Transport facilities, even though they cost money, *must* be provided.

TWO YEARS TO GO

THE Postmaster General has placed the air mail, as part of a general transport system for the carriage of passengers and goods, on trial for its life. With disconcerting abruptness, he and the assistant postmaster general directly in charge of the transportation of mail have informed the contractors of that fact. Still more disconcertingly, the period of trial has been inaugurated by a general reduction in the rates of payment for air mail service. The change comes as something of a blow to the air transport operators and their supporters, for it is scarcely eight months since the passage of the Watres Act, which operated to reduce the income of most of the contractors who had been able to make any money under the old system.

We have never been slow to express differences of opinion with the Post Office Department, but in this instance our trouble is elsewhere in Washington. It lies in the beautiful dome-capped building which stands on Capitol Hill. To be specific, it lies in the halls of Congress.

The air mail has its enemies. They became highly vocal during the hearings on the Post Office Appropriation Bill and the subsequent debate on the floor of the House and the Senate. There are members of Congress who think that the service has developed too rapidly; that it costs too much; that it is excusable only as a subsidy to the national defense, not as a service to business; and in general that it has done the things that it ought not to have done, and left undone the things that it ought to have done, and that there is no health in in. They may be profoundly misinformed, but that does not diminish their capacity for creating a disturbance—nor does it diminish the pressure that they can bring to bear upon the Postmaster General to fit his policy to their notions.

We are confronted now with an investigation of the air mail service by a Congressional committee. Though it does not bear that name, it is likely to be an investi-

gation none the less. It is no secret that the committee in its inquiries is going to find out that the air mail service is being operated at a heavy loss to the government. What will be concluded from that remains to be seen, but it is none too soon for the aircraft industry to begin a concentrated effort to develop an intelligent public understanding of the position. What we want is not a sentimental allegiance to the air mail, but an appreciation, in Congress and out, of the economic status of air transport, of why it is impossible to apply exactly the same rules to all lines, and of the lengths to which it may be necessary to carry the policy of government support in order to develop and maintain a properly co-ordinated air transport network in the United States.

Nowhere in the world, except possible on a few routes where no surface transportation previously existed, has air transport been independent of government support. In the United States the support has been so given as to offer much more incentive to progress towards independence than in European countries. The record in United States, unlike that in most other parts of the world, shows actual evidence of steady advance towards self-support, and the government outlay per unit of traffic in 1930 was less than half that in 1928. But some outlay is still required.

In short, the position of air transport, and especially of the air mail, is essentially the position of a great many other transportation enterprises and industries in their early days. Years of large-scale operation at a continuous deficit involve sacrifices too heavy to expect private capital to bear them, especially when there is no assurance of protection against the competition of newcomers in the field after the scale is turned. Government assistance is the only possibility. It is even more necessary for the airlines than it was for the railroads. We firmly believe that by the end of 1933, or at the very latest two years thereafter, the air mail will be fully self-supporting, which is more than it has ever been possible to say for various other branches of the postal service. The Postmaster General probably has a similar idea in mind when he talks of shutting down after two years more of trial. We think that he has made the period a little too short, but we rely on a reasonably generous interpretation, assuming that the results during the next two years show continued progress.

Congress does not need to look forward to a steadily increasing drain on the national exchequer to keep the mail flying. Up to the present time the deficit has been increasing because the service has been extending. We are inclined to think that absolute high-water mark is being reached during the present fiscal year, and that from this time on there will be a steady reduction in the operating loss. It would be peculiarly unfortunate if any inquiry into the conduct of the service just at the turning-point should assume the aspect of a muck-raking expedition. Fortunately, there is little reason to fear that the examination by the postal subcommittee of the House Appropriations Committee will take on anything of that color.

The trend of net cost is downward, but if it is to continue so, and if at the same time a proper service is to be maintained, it is indispensable that the estimates for the fiscal year 1933, which will be prepared within the next few months, should be treated in a generous spirit by the Bureau of the Budget and by Congress. Civic organizations which have learned by experience to value the air mail, and business men who would feel lost without its services, have the chance to make themselves heard in Washington. Some of them, in fact, are likely to be called before Representative Wood's committee. It will be both surprising and lamentable if the examination into the air mail contracts fails to give business leaders the opportunity of testifying to the value of air mail service in the smooth functioning of the affairs of American industry.

I TAKE MINE EASE IN MINE INN

PUBLIC facilities on airports are quite as important as 6,000-ft. runways as an aid to winning steady public patronage. Proper landscaping and provision of facilities for handling holiday crowds helps materially; establishment of first-class restaurants helps a great deal. These things are being done more and more widely on all large American airports. But the development of hotel service has lagged unaccountably.

Hotels or inns, with civilized dining-room facilities, present unrealized possibilities for drawing the class of patronage which airports and airlines most need. In Europe their number is steadily increasing. In America at least one such project, the Airport Inn on Oakland municipal airport, has operated successfully for a period of more than a year and a half. The plan has been to provide a hotel and restaurant of high quality, requiring no apologies to the general public, but to adapt these facilities especially to the service of airport personnel. Thus it is possible to provide a convenient home for flying students, pilots, and miscellaneous airport and airline attachés, and with the income from these sources to maintain a really attractive hostelry for the accom-accommodation of townspeople and transients. Several airport hotels are already being planned to operate on similar lines in other parts of the country, but there are not enough.

The Oakland Airport Inn has been a powerful influence in drawing civic groups and prominent citizens to the field for social functions and special occasions. The same good results can be had elsewhere. Aviation's most likely patrons would be brought in direct contact with the services that we seek to sell them. The relations between the aviation business and the general public would be consolidated. A few embryo Statlers, Bowmans, and Boldts would be very useful just now.

News of the Month

Air Mail Inquisition

UNDER specific authority granted by the second deficiency appropriation bill, members of the postal subcommittee of the House appropriations committee held an informal meeting on March 5 to discuss procedure for examining the handling of air mail and ocean mail contracts. It was decided at the initial meeting to assemble the committee again in April to make definite plans for conducting hearings. In all probability, the actual work of the committee will not start until next fall. Meanwhile the Post Office Department has been requested to submit much material bearing on air mail contracts.

An amendment to the deficiency bill was inserted in the Senate for a more complete investigation of mail contracts. This amendment was stricken out, however, by the conference committee. Senator McKellar, of Tennessee, who introduced the amendment, contended that the entire subject of mail contracts should be overhauled by Congress. His amendment would have authorized a joint committee of members of the House and Senate appropriations committees to investigate the letting of contracts.

Representative Wood of Indiana, chairman of the House appropriations committee, is chairman of the sub-committee now at work.

This Congressional action was preceded by a five-day conference between representatives of 26 airline companies and the Post Office Department ending Feb. 20. (See interview with Mr. Glover on p. 218.) In opening this conference, Postmaster General Brown asserted the expense of the air mail system to the government must be cut, that a new formula should be worked out, that Congress would be demanding proof of economic necessity of the air mail, and to the general amazement, that the Army and Navy considered commercial aviation practically of no potential use in time of national emergency. High officials of the services denied that assertion.

Postal Pay, New Style

The revised formula provides for reductions in the base rate ranging from $0.05 to $0.20 and for a cut of half a cent in the fog-flying variable. The maximum payable for a 2,000-lb. load in a large passenger plane will be $1.25 per mile. For the same amount of mail when carried in a single-engined plane without passengers the maximum will be $1.05 per mile. The change means an over-all reduction of $2,000,000 from the total payments being made under the present plan.

Postmaster General summed up the results thus: A new formula had been agreed upon which will make possible a larger proportion of the appropriation to be utilized for the greater development of air passenger service, as well as the carrying of mail. It means, however, that the operators will have to do more flying for the same pay.

Emphasis was placed by the Post Office on keeping pace with the improvement in flying equipment so that the average speed of 102 m.p.h. now maintained by mail planes may be advanced to 150 m.p.h. as soon as practicable. Hereafter, connecting mail-passenger planes will not be held for connections more than 30 min. when incoming planes are late.

The bill providing for the award of medals in recognition of acts of special heroism on the part of air mail pilots has become law. Awards under this law may be retroactive to May 15, 1918,

Transport Group Reorganizes

Of special significance to the airline operators is the reorganization of the air transport section, Aeronautical Chamber of Commerce, and attendant inclusion of a number of important companies not previously members. Headed by Capt. Thomas D. Dóe, of Eastern Air Transport, the section has been very active during the winter completing its internal organization and building a program for the coming year. Its committees and chairmen are: traffic, T. B. Clement, Transcontinental & Western Air; operations, H. A. Elliott, E. A. T.; and business practices, F. J. Carr, Aviation Corporation. The approximately 25,960,000 mi. flown yearly by the member lines represents 90 per cent of the total flown by all American transport operators.

Following the tendency to step-up frequency of service, Colonial Division, American Airways, on March 2 doubled its scheduled trips on its New York-Hartford-Boston passenger service to six daily each way—every two hours. At the same time the fare was reduced to $15.85 (from $0.09 to $0.08 per mile). This frequency enables close connection with other lines at Newark so that passengers to and from such points as Atlanta, Cleveland and Chicago may get to and from Boston the same day.

Air Ferries, Ltd., San Francisco, one of the leading exponents of the frequency principle, has continued operations through the winter on a reduced schedule of a flight each hour. It has now increased its afternoon schedule to a flight every 30 min. More frequent service is planned for the summer months. The Seattle-Bremerton ferry has resumed its hourly schedule.

Steady increase in scheduled and miscellaneous traffic, with seventeen round trips now scheduled each day, over the New York-Washington airway has led the Department of Commerce to warn that strict observance of the right-side flying rule must be maintained.

Recent extensions in services include: Cleveland-Louisville mail service of the Embry-Riddle Division, American Airways, south to Nashville, effective Mar 2; the Tulsa-Kansas City passenger line operated by Braniff Airways, through to Chicago, accompanied by a reduction of the Tulsa-Kansas City fare from $14.50 to $12.50 ($0.06 per mile). The through rate to Chicago is $37.50 and the trip is flown in 4 hr. This company reports a profit in January of $1,100. Both Universal and Embry-Riddle have cut their passenger rates between Chicago and St. Louis, between Chicago and Cincinnati and between Chicago and Indianapolis to about $0.06 per mile.

Calendar

March 25-27	Third National Conference, Airport Section, Aeronautical Chamber of Commerce, Mayo Hotel, Tulsa, Okla.
April 11-19	All-American Aircraft Exposition, City Airport Hangar, Detroit.
April 14-15	Second Annual National Aeronautical Education Conference, Aeronautical Chamber of Commerce, Hotel Statler, Detroit, Mich.
May 1-10	First Annual Mexican International Exposition, Central Airport, Mexico City.
May 15-17	Annual Air Races, Omaha.
May 15-31	International Aero Exhibition, Stockholm.
June 8-15	F.A.I. Conference, Bucharest, Roumania.
July 4-25	National Air Tour.
Aug. 29-Sep. 7	National Air Races, Cleveland Municipal Airport.
Early Autumn	Schneider Trophy Contest England.

Short Cut Opened for Traffic

Scheduled service over the Richmon-Jacksonville cutoff, which has been under construction by the Department of Commerce for some time, will be opened by Eastern Air Transport about April 1. Planes carrying both passengers and mail will be flown over it once daily at first; stops will be made at Raleigh, Florence, S. C., and Savannah.

Pan American Airways extended its East Coast of South America passenger service south from Para to Rio de Janeiro on March 5, using Consolidated Commodores. The Sikorskys previously flown on this section carried mail only.

Mail poundage on four divisions of the Pan American system totaled 14,782 in December, an increase of 22 per cent over the poundage for July. About 35 per cent of the December traffic was over the Miami-Canal Zone route and all but 1,750 lb. of the total were carried by the Central American and Carribean services. There was almost twice as much mail sent south as was dispatched northward but the northbound volume was larger in December than in July. The Miami-San Juan northbound volume increased 60 per cent in the six months—a notable growth—while the other three divisions increased about 15 per cent.

For 1930 the Pan American Airways system reported a mail traffic more than four times that of 1929, and a passenger traffic increased by 70 per cent, to 9,700,000 passenger miles. Ninety-eight aircraft are in service on the lines. The financial report of the Pan-American holding company, the Aviation Corporation of the Americas, showed a deficit of $305,271 for 1930, or 67 cents per share of stock.

National Air Transport speeded up its air-rail service between New York and Chicago by transferring passengers to and from trains at Lindale, Ohio, a Cleveland suburb. Passengers are carried by motor coach to and from the Cleveland Airport, saving 2 hr. in the total transit time. The through rail-air fare costs $50.73 west and $49.53 east.

Additional airline projects have been promised. Transamerican Airlines Corporation plans opening April 1 a passenger service between Chicago and Detroit, and resumption of its trans-lake service between Detroit and Cleveland.

About May 1, Internatioal Air Express plans to launch 25-hr. service between Detroit and Brownsville via St. Louis.

The opening of Century Airlines with high frequency service in the lower Great Lakes area, originally scheduled for March 9, has been postponed for a few weeks.

A recent consolidated report of 1930 operations of W.A.E., West Coast and Midcontinent Air Express showed a passenger traffic increase of about 76 per cent over 1929. Transcontinental & Western Air's two Fokker F-32's were flown 2,398 hr. between May 1, 1930 and Jan. 15, 1931, over the San Francisco-Los Angeles route. One accounted for 1,250 hr., an average of 150 hr. per month. These machines have not been in regular service since Dec. 1.

Air Express Gaining

A neglected department of air transportation, air express, is beginning to get some of the emphasis it deserves. Following the recently announced efforts of Transcontinental & Western Air to stimulate express patronage, the New York-Philadelphia & Washington airline inaugurated express service in cooperation with the Western Union and associated airlines, and Western Pacific Air Freighters has begun operation of an exclusive freight service.

The Ludington line began carrying express on all its services Feb. 15. The rate between New York and Washington is $1 for the first pound and $0.20 for each additional pound. Liability is limited to $50, with an additional charge at the rate of $0.30 for each $100 valuation or fraction thereof on packages valued in excess of $50. Collections and deliveries are by Western Union, without extra charge. A similar accommodation also using Western Union, has been provided by Colonial for more than a year with fair patronage.

Western Pacific Air Freighters began operating Feb. 24 between Oakland, Reno, Boise, and Seattle. A tri-engined Ford is flown over a circular route three times a week, the machine going from Oakland to Seattle, thence to Boise and back to Oakland via Reno. Rates are comparable to the rail tariff for perishables. Contracts for regular shipments have been closed with poultry and dairy interests.

British Line Opens

British air transportation routes were increased by 2,670 mi. March 5 when scheduled operation was started over the northern section of the Cairo-Cape Town airway (Cairo to Mwanza). Imperial Airways routes now total 10,000 mi. and 2,145 mi. will be added when the Mwanza-Cape Town section opens in the early summer.

Armstrong-Whitworth Argosies are used between London and the north coast of the Mediterranean and between Cairo and Khartoum. Short Calcutta flying boats are used across the Mediterranean and between Khartoum and Mwanza. A weekly schedule in each direction will be maintained for the present with connections at Cairo with the weekly Indian air mail planes to and from England and Karachi.

Travel times between terminals: four days Cairo-Mwanza; five days London-Cairo, three days Cairo-Karachi. The complete London-Cape Town service will be flown in eleven days, a saving of six days over the best surface transport.

Imperial Airways has adopted for its line personnel a set of uniforms and rank insignia as elaborate as, and similar to, those in the naval and merchant marine services. First and second pilots, various grades of mechanics, and airport managers, will be identified by various combinations of blue and white half-inch sleeve bands. Special insignia will mark the pilot more than five years in the service of the company.

One of the first commercial autogyros has been delivered to the Detroit News, supplementing the company's Lockheed Vega, in operation for some time

Lockheed in Europe

American invasion of the European air transport field under English auspices looms in a projected express-passenger service between London and France with Lockheed Vegas. Details have not been received, but the fact that the Vega recently acquired by Commander Glen Kidston, wealthy British sportsman, was flown between Paris and London recently in 1 hr. 12 min.—an average speed of 175 m.p.h., and a new record for that trip—promises a stir in European circles. There is no commercial plane built in Europe approaching the Lockheed in performance.

Ever persisting in the development ot a seaplane or flying boat suitable for scheduled operations across Aeropostale's South Atlantic mail route, the Latecoere company has turned out an all-metal monoplane, model 38-0. The hull is 49 ft. long, the wing span 103 ft. It is powered with two Hispano-Suiza water-cooled engines of 650 hp. each, has an average cruising speed of 103 m.p.h. and range with maximum load of 2,800 mi.

Autogyros Sold to Five

Although sales managers and their forces are just at present concentrating on the International Aircraft Exhibit to be held in Detroit this month, domestic and foreign sales are still being reported. The Autogyro Company of America, now on a production basis, states that contracts for delivery of several machines have been completed. Among the purchases of autogyros are the United States Navy, the Detroit *News*, Standard Oil Company of New York, the Horizon Company of Wilkes-Barre, Pa., and John M. Miller, a pilot of the New York Central Airline. The first commercial autogyro was purchased by the Detroit *News*, and delivered on Sunday, Feb. 15. The craft purchased by the Standard Oil Company of New York will be used for research work and testing lubricants for autogyros. John M. Miller is to use his craft for passenger flying. This will be the first time in this country that an autogyro will be available for joy-hopping by the public.

Announcement has been made that new developments in the construction of the English-made autogyro are expected during the present year. The latest English type can be taken off in 30 yards, and has a top speed of 90 m.p.h. The Cierva system was experimentally adapted to seaplanes last summer and the first result has been an order by the French government for two autogyro float seaplanes fitted with Renault engines for service with the French fleet on reconnoissance duty. Construction of an autogyro flying boat is in the offing.

An important sales meeting was staged by Curtiss-Wright at St. Louis during the last two weeks of February. About 200 dealers visited the St. Louis plant for presentation and demonstration of the new plane models, and inspection of the factory.

The large increase in the use of radio equipment in aircraft operations is responsible for a statement by the Western Electric Company. Production of aircraft radio sets in 1930 forecast at $400,000, totalled $800,000 at the end of the year.

Although last year was virtually the first in which the Western Electric Company had done business in the aviation field with communication apparatus, it fitted out 60 ground stations and 125 transport planes with its equipment. In addition, one-way radio-telephone receivers were installed on 100 transport planes.

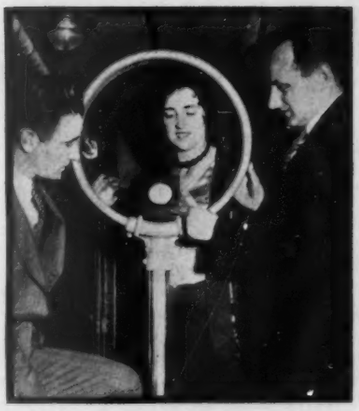
Aviation Goes to Court

A committee of fourteen members of the Aeronautical Chamber of Commerce, accompanied by Secretary Clarence M. Young and headed by Charles L. Lawrance, president of the Aero Chamber, recently called on President Hoover to present to the chief executive a detailed report of the conditions existing within the industry at the present time. Mr. Lawrance told the President that aviation had passed through the readjustment period of last year and was now rid of many deterrent factors and in a position to be rapidly developed along progressive lines.

The past few weeks have been exceptionally productive of important legal decisions and legislative developments. Of first industrial importance is the reversal of decision in the parachute patent litigation of the Irving Airchute Company and the Floyd Smith Aerial Equipment Company, plaintiffs, against the Russell Parachute Company for infringement of Floyd Smith's patents of 1918-1919. A previous decision in favor of the Russell interests had been rendered by the Delaware District Court. [AVIATION, June 14, 1930.] This has now been overthrown by the Circuit Court of Appeals, which upholds Smith in his claims on many of the basic features of the modern pack chute. An accounting and financial adjustment has been ordered.

Cases on aerial trespass and the rights of property owners to control flights overhead continue to accumulate. The issue continues disputed. In the Worcester Airport case aviation won a partial victory. In the Cleveland Curtiss Airport case of last summer it suffered a shattering defeat. In a recent case in Omaha aeronautical interests came off triumphant when Federal Judge Woodrough directed a favorable verdict for the Boeing Air Transport Company in an action seeking to recover damages by the Nebraska Silver Fox Farm, it having been alleged that the noise of the planes so frightened the mother foxes that they destroyed their young.

Another point of general law has just been disposed of by the United States Supreme Court in a decision handed down by Justice Holmes on the day following the celebration of his ninetieth birthday. It was held by the court that an airplane was not a "motor vehicle" within the meaning of the provisions of the National Motor Vehicle Theft Act. The judgment was a reversal of a decision of a lower court under which one William McBoyle had recently been sentenced to three years in prison and a $2,000 fine for stealing a plane and transporting it across the state line. [AVIATION, Sept. 30, 1930]. Unless the law is amended aircraft theft will have to be prosecuted only under state law, and within the state where the theft takes place.



The radio direction compass installation which enables use of high frequency commercial broadcasts from stations located at points toward which it is desired to fly. The pilot of a Transcontinental and Western Air transport recently tuned in on a Los Angeles program while 100 mi. from that city and was guided successfully to the airport. On the right is Dr. Carl Fisher, co-inventor.

Senate Ratifies Air Pact

Outstanding among recent developments affecting the legal position of aircraft is the ratification of the Pan-American Air Navigation Convention of 1928 by the United States Senate, which took place on Feb. 20. After more than two years of delay in submitting the convention for action, it was finally ratified without debate. Thus there comes into existence between the United States and other signatories a guarantee of free aerial traverse of each other's territory. As yet the convention has only a limited significance, for only Panama, Mexico, Guatemala, and Nicaragua, in addition to the United States, have so far ratified. Other ratifications are likely in the near future, as some governments waited on the action of the United States before taking their own decision. In general the Pan-American Convention follows the outline of the International Convention drawn at Paris in 1919, to which 27 countries are now parties.

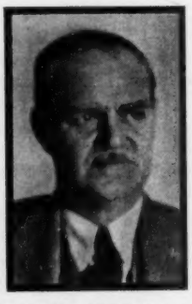
A less conspicuous senatorial action, but one having very definite significance for international aerial relations, was the final approval of the bill to pay America's share of the expenses of the International Technical Commission of Juridical Aerial Experts. America thus finally succeeds to full and unrestricted standing in the body which devotes itself to the study of aerial private law and to working towards the reconciliation on the various national codes. The

passage of the bill, which had lain dormant in Congress for more than a year, was accomplished at the special instigation of Senator Bingham.

States Consider Air Laws

In aeronautical legislation within our own boundaries, local law-making bodies have been active. In 32 of the 48 states they have recently been considering bills of direct aeronautical interest. As specific accomplishments, Arkansas has created a division of the state highway department to assist in the development of airports and airways. Part of the expenses of the new department will be raised from a gasoline tax on all but scheduled flying. This distinction between scheduled transport operations, to be immune from the tax, and other flying, to be still subject to it, is a novelty. Of the seven states which are still without regulatory statutes of any kind, Alabama is preparing an aviation code. Oregon has recently enacted an act to provide for the establishment of emergency fields along the public beaches of that state, a measure of particular importance where the coastal area is so rugged.

Officials of the Chevrolet Aircraft Corporation, Baltimore, Md., a subsidiary of the Glenn L. Martin Company, have announced that the company's name has been changed to the Glenn L. Martin Motors Company. Inverted air-cooled engines will be the product. Mr. Glenn L. Martin of the motor company will be president, Mr. Charles A. VanDusen vice-president of the motor as well as of the airplane company, Mr. Louis Chevrolet vice president and general manager.



Louis Chevrolet

The Emsco Aircraft Corporation of Downey, Cal., has been granted an approved type certificate on its Wasp powered nine-place cabin monoplane and its Cirrus powered mid-wing trainer. Operations at the plant have been speeded up, and recent staff additions include J. L. Cato, production manager; Gerald F. Vultee, formerly chief engineer with Lockheed, chief engineer; Roger Q. Williams, trans-Atlantic flier of 1929, chief pilot; and Miss Aline Miller, demonstrator. The company also announces it has delivered to Roumania a long-distance machine to be used by Prince Joan Matei Ghica in an attempt to break the present straight line distance record by a flight from Budapest to Cape Town.

National Air Race Program in Making

A tentative schedule of events for the 1931 National Air Races to be held at Cleveland, Ohio, Aug. 29 to Sept. 7, has been released by the National Air Race headquarters, Cleveland. In general, the events differ little from those of last year. Briefly, there are three derbies and 40 racing events and the usual parachute and dead stick landing contests. The On-to Derby will be open to both men and women pilots and will be flown from some Western city to Cleveland. The men's Derby, a handicap affair, will probably start from some mid-western city and go to Washington, D. C., then return to Cleveland. The women's Derby, also handicap, will follow the same route. Of the total 40 racing events, 27 are for men only, 7 for women only, and 5 for military planes only. There is one mixed racing event. The one entirely new event which appears on the program is the autogyro race, for men pilots only, five laps over a 10-mi. course for prizes totalling $1,000.

There is little news this month on the blue ribbon air race for this year—the Schneider Trophy Contest. Teams are reported to be training and race equipment is being groomed. Talk of American participation in the event has ignored the fact that under the rules the F.A.I. can make no exceptions, and can accept no entries after the closing date, Dec. 31. A charter of incorporation has been issued to Al Williams, Inc., a new company presumed to be devoted to experiments with high-speed craft.

Three Shows Feature Aviation

Two air shows in Latin American countries compete with the national event at Detroit for notice. A British exposition is now being held in Buenos Aires. The city of Mexico will put on its show in May.

The first annual Mexican International Aeronautical Exposition is to be held at Central Airport, Mexico City, May 1-10 inclusive. The exposition will include an aircraft and general industrial exposition, and a series of races. Participation of aeronautical firms and pilots from England, France, Italy, and the United States has been sought. The event is sponsored by the Mexican government, staged by the Aero Club of Mexico. A separate American committee, headed by William E. Arthur, has been formed to supervise all American participation.

Air Tour Routed

That well-known flying "show," the National Air Tour, is to start from Detroit on July 4 and to penetrate Mexico as far as Mexico City, according to the tentative itinerary. Thus the Tour Committee meets the suggestions, advanced from a number of quarters, that the tour should be sent into Latin America for a sales demonstration. The route is shown at the right.

James H. Doolittle of the Shell Oil Company will referee. Lieutenant Doolittle, Edward P. Warner, editor of AVIATION, Carl F. Schory, and William S. Brock are to be the members of the technical committee on the Tour. The formula of the Tour is to remain as in 1930, but the general rules of operation have been the subject of further consideration in Detroit and in a meeting of representatives of the industry and of transport lines in New York.

Some notable soaring has been done in the New York City area in recent weeks. Wolfram Hirth and Jack O'Meara of the Bowlus-Hirth Institute of Soaring made three flights at the school's Warwick, N. Y., training camp of more than 4-hr. duration each. On another occassion O'Meara was plane-towed to about 3,500 ft. above the city and soared for about 35 min. in the vicinity of the Queensboro Bridge. On March 10 Hirth soared for about 55 min. over upper Riverside Drive and descended only at the expiration of the time allotted for special traffic arrangements.

Personnel Shifts Announced

A number of companies have announced executive changes.

At a recent meeting of the board of directors of the United Aircraft & Transport Corporation, E. E. Wilson was elected president of the Chance Vought Corporation, a subsidiary of the holding company. Mr. Wilson, succeeding F. B. Rentschler, who becomes chairman of the board, recently resigned the presidency of the Hamilton Standard Propeller Corporation. He is also president of the Sikorsky Aviation Corporation.

At the annual meeting of Aero Underwriters Corporation and subsidiary companies, Horatio Barber resigned his position as president and became chairman of the board. George L. Lloyd, former first vice-president of the company, was elected president of the Aero Underwriters Corporation, and the corporation's subsidiaries Aero Indemnity Corporation, Barber & Baldwin, Inc., and Aero Engineering & Advisory Service, Inc. A. B. Roome was appointed president of Aero Insurance Company.

Changes have been made in the executive personnel of North American Aviation, Inc. C. M. Keys has been appointed chairman of the board, Thomas A. Morgan, president of Sperry Gyroscope, Inc., is the new president, J. Cheever Cowdin vice-chairman of the board of directors, and Thomas B. Doe first vice president of the corporation.

At the annual meeting of the Breese Aircraft Corporation of Portland, Ore.,

held in February, James H. Lynch, former executive vice-president of the company, was elected to the presidency.

The Boeing Airplane Company has announced the appointment of James D. Murray, Washington representative, as vice-president of the company.

Capt. Frank T. Courtney, well-known British test pilot, has resigned as technical advisor to Curtiss-Wright Corporation and opened offices in New York as a consulting engineer on aeronautical matters.

Larry G. Fritz, former Safeway Airlines vice-president, has been appointed Southwestern distributor for the all-metal low-wing Northrop Monoplane.

Edward Hudlow is now general manager and vice-president of the Spartan Aircraft Company, of Tulsa.

Unofficial report from Washington is to the effect that the command of the new Navy airship Akron, now nearing completion at the Goodyear plant, Akron, Ohio, will be given to Lieut.-Commander C. E. Rosendahl, former commander of the Los Angeles. At the present time Commander Rosendahl is in charge of Navy lighter-than-air training.

George I. Stich has resigned as president of Aero Supply Manufacturing Company and has been succeeded by Frank N. Ames.

Mention was made in last month's news section of AVIATION that the committee on appropriations had inserted in the Navy Bill a stipulation that the Navy Department should make no further increases in the number of officers above the rank of lieutenant-commander, assigned to aviation duty. The provision was removed before the bill passed the House.

To obtain first-hand information on conditions in Europe and the opportunity of further developing American aeronautical sales there, Capt. Frank M. Hawks is sailing for the other side of the Atlantic on Mar. 31 to make an extended flying tour. Captain Hawks will take his Travel Air monoplane.

More Financial Reports Made

The best financial news of the month again comes from the manufacturers of government equipment. The Douglas Aircraft Company, which recently announced record earnings during 1930, has declared an extra dividend of $0.25 a share in addition to the regular semi-annual dividend of $0.50 a share payable April 20 to holders of its 341,086 shares outstanding. The Glenn L. Martin Company reports a gross business of over $2,000,000 for the past year, with a net profit from operations or $409,006 and a gross income of $436,738 available for: interest $162,796 amortization of note discount and expense $63,800; experimental and development costs $135,357; miscellaneous expenses of $861. A net income of $73,924 was transferred to surplus.

The Consolidated Aircraft Corporation made sales of $4,345,171 during the year, almost evenly divided between government and commercial business. The net income after taxes was $127,091, or 22 cents per share of stock outstanding.

North American Aviation has also issued its 1930 statement. During the past year the aspect of the corporation has changed materially from that of a holding company to that of one principally engaged in operations under its own control. The four units which it owns outright, the Sperry Gyroscope Company, Eastern Air Transport Inc., Ford Instrument Company Inc., and the B/J Aircraft Corporation, have earned a net income during the past year of $1,911,110.75 as against $1,647,449.55 for 1929. Offsetting this splendid showing was a further reduction in the value of the stock holdings of the corporation, which are heavy in Curtiss-Wright, Douglas and Transcontinental Air Transport. The valuation of securities held dropped off $3,688,338.55 during 1930, although some of this has been regained since Jan. 1. The company withdrew a plan to distribute 10 per cent of its earnings among the active executive staff on the protest of a stockholder that sufficient notice of the transaction had not been given. The board of directors was reduced from 60 to 45 at the annual meeting March 11.

National Aviation Corporation reported a net consolidated deficit of $1,677,070 for the year, showing a net asset value of $8.05 per share as of Jan. 1. Again, the value of the holdings had recovered sufficiently to warrant an equivalent value of $9.50 on Jan. 31. The net asset value per share on Jan. 1, 1930, was $11.54.

General Aviation Buys W. A. E. Stock

Major control movement of the period was the acquisition of 24 per cent of the outstanding stock of Western Air Express, Inc., by General Aviation Corporation. This represents a complete absorption of a sale of 50,000 additional shares needed for working capital, makes General Aviation Corporation the largest minority stockholder. and may be sufficient for operating control.

As a result of this transaction, three representatives of General Aviation were elected to the board of directors of Transcontinental & Western Air. They are Frederick Fisher and C. E. Wilson, of Detroit, and J. M. Schoonmaker of New York City. T. W. Streeter, of New York, was elected, also. Alternates chosen include E. R. Breech, D.

B. Whitney, Albert Bradley, Henry M. Hogan, E. O. McDonnell, and William P. MacCracken, Jr. At the last meeting of the board W. M. Garland, J. A. Talbot, R. B. Hale and Mr. MacCracken resigned as directors.

Another readjustment followed sale of West Coast Air Transport, a Western Air Express subsidiary, to Pacific Air Transport, of the Boeing System, early in March, the transfer taking effect March 15. Present schedules are to be continued.

Canadian Combine Has Good Year

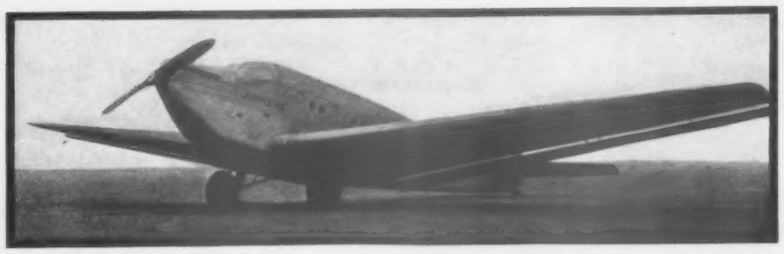
In its first annual report, Canadian Airways, Ltd., formed by merger of five Canadian companies early in 1930, revealed net operating revenue of $1,817,543 and a net loss after all charges, including depreciation, of $68,704. A drop in traffic with the curtailment of mining operations contributed largely to the latter. The company's units carried 333,913 lb. of mail, 501,439 lb. of freight and express, and 8,800 passengers. Planes were flown 1,968,000 mi. during the year. Total assets were $3,311,668 at the end of 1930.

Of note is the reorganization of the American Cirrus Corporation following a receiver's sale of assets. Sale was made to a group of Chicago business men headed by Lee Hammond. Inventory included 30 complete Cirrus engines, and parts for about 300 more. Sale price was $105,500. Following reorganization the plant has recommenced activities with W. R. Blacklock, former assistant treasurer of the company, as general manager. A new price was at once set on the engines, the upright Cirrus now being available at $795 and the Hi-Drive at $895.

On the exchange basis of five shares of Fairchild Aviation Corporation stock for two of The Aviation Corporation, the latter concern has taken over the Fairchild airplane and engine companies. Fairchild retains the other units, which include the Fairchild Aerial Camera Corporation, Fairchild Aerial Surveys, Kreider-Reisner Aircraft Company, Fairchild Aircraft, Ltd. (of Canada), and Aviation Corporation of Canada. The KR 21 model will be built at Hagerstown, Md., and the 71 Model at Montreal.

Port Construction Increases

Airport construction and improvement work is increasing with the advent of spring. Outstanding hangar projects include: A $35,000 structure at Sacramento, Cal., Municipal Airport; a 120x160-ft. hangar at San Francisco Bay Airdrome, Alameda; a 90x130-ft. hangar at Lindbergh Field, San Diego, for Pacific Air Transport; and a 100x114-ft. hangar at the International Airport, Nogales, Ariz.



At last a restaurant for the Newark Airport. Following much agitation over a long period, a one-story brick building costing $30,000 is to be erected on piles already driven at the port. It measures 45x37 ft. and will be of Spanish design. The Aero Food Corporation will occupy it. Newark has just completed also, a new two-story brick building to house the mail and Weather Bureau forces.

Ground was broken recently at Miami for a $650,000 seaplane base of 33 acres for Pan American Airways. Work started at once on the first of four $55,000 hangars measuring 140 ft. square. The 109-room Ford Airport Inn is to be opened in June under management of the L. G. Treadway Service Corporation.

Despite the setback of general activity at the Buffalo Municipal Airport, a profit of $7,364.58 is recorded for the six months ending Dec. 31. Total income for this period was $26,643.06, total expenditure $19,278.48. The income was distributed in part as follows: Hangar rental $11,666.98; heating services $10,064.61, and city's 5 per cent share of passenger carrying $511.71. Passenger flying netted the operators $10,234.20.

As this goes to press, the airport section of the Aeronautical Chamber of Commerce was putting final touches to its program for the Third National Airport Conference at Tulsa, March 25-27. A full report will be included in May AVIATION.

Oakland Gets Rating

Oakland Airport is the fifth to receive the AIA rating granted by the Airport Section, Aeronautics Branch. The first four were Pontiac Municipal Aiport, Denver Municipal Airport, Rickenbacker Airport at Sioux City, Ia., and the Brownsville Municipal Airport.

Lighting of the Seattle-Tacoma-Portland-Spokane - Pasco - Boise - Salt Lake City Airways has been completed. Installations on this 1,028-mi. airway include 92 revolving beacons of 2,000,000 cp. each, 14 acetylene blinker lights, and 28 emergency landing fields. The most difficult portion of the work was the installation of red and green side lights along the Columbia River gorge.

Recent personnel changes include appointment of H. S. Darr as manager of Curtiss-Steinberg Field, St. Louis; C. Eugene Johnson, veteran air mail pilot and operations manager of Pacific

The new Junkers air freighter. Note the extreme span of airlerons and the use of tail wheel. Hatches at top and side of fuselage facilitate loading.

Air Transport, as vice-president of the latter company, and Russell Cuningham as general superintendent of operations under Mr. Johnson.

Navy Studies Cockpit Gases

But few important items concerning technical development through research have appeared in the last month. One takes the shape of an announcement by the Navy Bureau of Aeronautics of an investigation it has been carrying on since last October into the presence of carbon monoxide in the cockpits and passenger compartments of its planes. Co-operating with the Navy Bureau of Medicine and Surgery, a series of tests were run on the blood contents of pilots after 4-hr. flights in practically every type of plane operated by the Navy. In only two cases did the tests show the effects of monoxide inhalation. Samples of air were then collected from all levels of the cockpits below the breathing level, and in several more cases positive amounts of the gas were found. In no case was the quantity sufficient to more than give a slight headache to a person particularly susceptible to its effects. Nevertheless, studies were immediately carried out of the exhaust arrangements of the offending planes, and in each case it was found the gases could be entirely eliminated by

simple changes. Work is also going forward on an instrument to be mounted on the plane's dashboard which will warn the pilot whenever there is any trace of the monoxide.

From National Air Transport comes the report that a two-month trial of rubber wing shoes to combat ice formation will be carried out on its New York to Cleveland run. The shoe is a joint development by the N. A. C. A. and the B. F. Goodrich Company.

Airship Effectiveness Debated

The recent participation of the Los Angeles in the naval maneuvers off Panama seems to have produced no definite majority decision one way or another in the minds of the naval authorities as to the real value of the airship in war-time operations. Leaving Lakehurst Feb. 5, the 7-yr.-old German-built ship completed a highly satisfactory trip via Guantanamo, Cuba, to the tender Patoka anchored in the Pacific. After a number of local flights, it officially entered the maneuvers as a part of the defending forces. For two days she carried out assignments in sectors in which no enemy vessels were sighted. On the third day contact was made with the attacking fleet. A few minutes after her radios had been sent reporting this fact, the ship was "shot down" by a group of airplanes operating from one of the attacking airplane carriers.

Claimed many of the surface commanders: "Because of its huge bulk the airship can be sighted as soon as it can sight surface vessels. The main body of the attacking fleet had already been reported by airplanes and surface scouts. The cost of airships are much better expended in surface craft carrying airplanes."

Claimed the friends of the airship: "Even the first two days' negative results were of great value. The Los Angeles is at best an experimental ship prevented by the terms of its delivery from carrying armament or defending planes. A new type such as the ZRS-4 would never have been sighted by an enemy because the actual contact would have been made by the five planes with which it will be equipped. The same new type would have had the defense of its planes and many machine guns and with its higher speed would have been generally less vulnerable."

It is pointed out at the Navy Bureau of Aeronautics that the appropriations for the present year include an item of $100,000 for work on the ZRS-5, and that the Navy Appropriation bill for 1932 contains a provision of $1,000,000 for the same purpose. Fabrication of parts for the second ship may be started by the Goodyear-Zeppelin company at any time at its own risk, if it so saw fit. Ultimate decision seems almost certain however to await the launching and test of the one now building, the contract specifying that the Navy reserves the right to cancel the order for the second ship any time before the delivery and acceptance of the first.

Prepare for Akron Launching

Meanwhile in Akron the completion of the ZRS-4 is rapidly approaching. The actual date of delivery and launching is still uncertain but there is little doubt that it will be in the hands of the Navy by the middle of the summer. Already work has commenced on the fitting and doping of the outer cover and the senior inspector, Lieut. T. G. W. Settle, has perfected plans for the policing and general management of the expected crowds of spectators. The arrangements include a fence around the airport 4 mi. in length and a guard of 500 men, as it will be highly important to have the field entirely clear when the ship is pulled from the hangar by the portable stub mast to which it will be moored.

Inconclusive also was the effort to get favorable action from the late Congress on the McNary-Parker bill, which provides mechanism by which the Post Office Department can contract with commercial airship lines for the transport of transoceanic mail. Although favorable report from the House committee, before which hearings had been carried on, at one time seemed possible, press of other legislative matters prevented any definite action before adjournment. The bill must therefore come up anew in December.

From Germany came Dr. Eckener on a recent visit to consult with Goodyear-Zeppelin officials. While here he disclosed plans for flights in April and May of the Graf Zeppelin to Egypt and Spain and for later in the summer a series of three flights to South America with air mail.

Part of the ill-fated R-101 will fly again, but under German auspices as part of the new German dirigible; the Zeppelin works bought the metal remains of the British airship for remelting and fashioning into parts.

A 30-hr. test flight was successfully made recenlty on a new naval dirigible built under Japanese auspices.

French Air Status Challenged

Following the most recent upheaval of the French Cabinet, M. Jacques-Louis Dumesnil, who served a term as under-secretary for air a number of years ago, has been appointed Minister of Air to succeed M. Paul Painlevé. Just as he assumed office the Chamber of Deputies was hearing charges that French air defense is inadequate and inefficient. Georges Leygues, former Minister of Marine (1926-1928), proclaimed French naval aviation obsolete and practically non-existent. In the movement to strengthen the military aviation, Marshal Petain, hero of Verdun, has accepted the new post of Inspector General of Air Defenses on Land.

France's most spectacular airline struck a snag last month. A proposed new subsidy arrangement with Companie Generale Aeropostale, operator of the air mail line to South America, was rejected March 6 by the Chamber of Deputies. At the same time the Air Ministry's contracts with manufacturers and commercial airlines in general were severely criticised. The way was left open, however, for renewed negotiations regarding Aeropostale's finances. Alleged to be virtually bankrupt, it was provided by government decree with $120,000 to meet immediate emergencies.

On the same day the Chamber adopted the Air Ministry's estimate of $90,000,000 for the 1931 budget, an increase of $7,000,000 over the amount for last year. The budget is distributed: 76 per cent to military aviation; 14 per cent to commercial aviation; 10 per cent to technical development.

The hearings were featured by challenges concerning intimate business relations between Pierre Etienne Flandin, well known in this country as the head of the French delegation to the 1928 International Aeronautical Conference at Washington, and the Aeropostale company while he was serving as Minister of Commerce.

Junkers Builds Cargo Plane

Specifically for transportation of air express in large quantities, the Junkers Company have developed the JU-52, single engined monoplane of more or less conventional Junkers construction but with a spacious fuselage accommodating about 6,600 lb. of freight. It is powered with a B.M.W. VII water-cooled engine of 685 hp. and has a cruising speed of about 100 m.p.h. The express compartment measures 21x5x6 ft.

Notable among new European designs of the month is a British single-seater fighter, the Gloster S.S.19. In addition to its six guns, two mounted in grooves on the fuselage and a pair on the leading edge of each wing outside the propeller arc, the machine carries racks for four 20-lb. bombs. Powered with a supercharged Bristol-Jupiter of 480 hp., it is credited with reaching 15,000 ft. in 9 min., maintaining 194 m.p.h. speed at ground level with full service load and 188 m.p.h. at 10,000 ft. It has a metal fuselage, is equipped with a Townend ring and is another of the Interceptor type designed particularly to combat foreign invasion by air.

The English Blackburn Airplane & Motor Company recently signed a 7-yr. extension contract with the Greek government for operation of the aircraft factory at Phaleron, near Athens.

Statistics of the Month

Material supplementing the statistical issue, AVIATION, *March, 1931, appears regularly each month. Page numbers in the statistical issue are given.*

PRODUCTION AND LICENSING

Preliminary Summary from Census of Manufacturers

(Sales by Manufacturers of Aircraft and Parts, 1929)

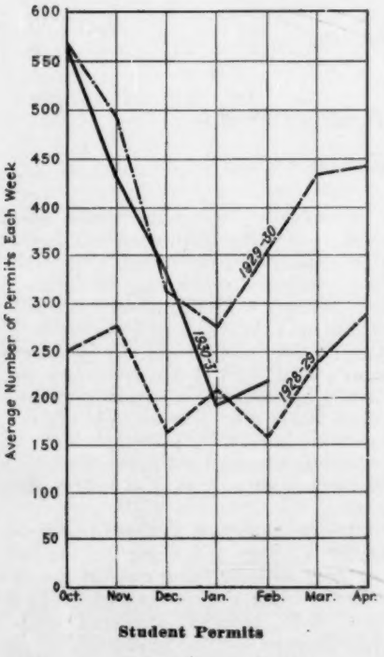
	Selling value (F.O.B. factory)	Percentage of sales	Number of plants reporting sales by each method
Total	$60,752,000[1]	100.0	130[2]
Sales from factories direct to users[4]	32,930,000	54.2	77
Sales from factories to dealers	20,504,000	33.8	42
Sales to manufacturers' sales branches in the field[3]	7,318,000	12.0	16

[1] This figure does not include $617,737 worth of repair work nor $8,183,187 worth of inventory and experimental work.

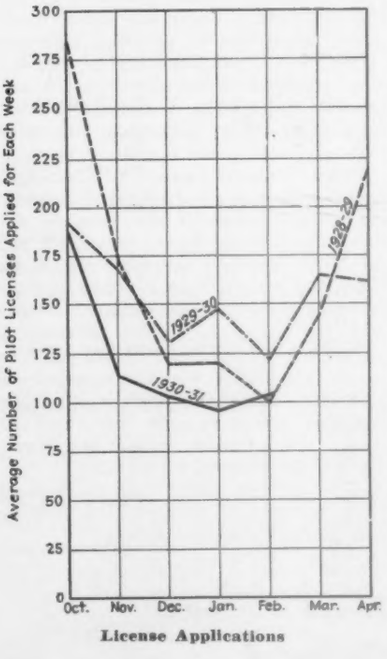
[2] The total number of establishments engaged primarily in the manufacture of aircraft and parts is 130. Inasmuch as some establishments sell to more than one type of customer, this figure is less than the total figures shown below.

[3] This report does not cover the sales by manufacturers' sales branches to dealers or to users, nor does it cover the sales by these sales branches through manufacturers' agents, selling agents, brokers, and commission houses.

[4] Of which sales were made through manufacturers' agents, selling agents, brokers, and commission houses to the extent of $8,124,000.



Student Permits



License Applications

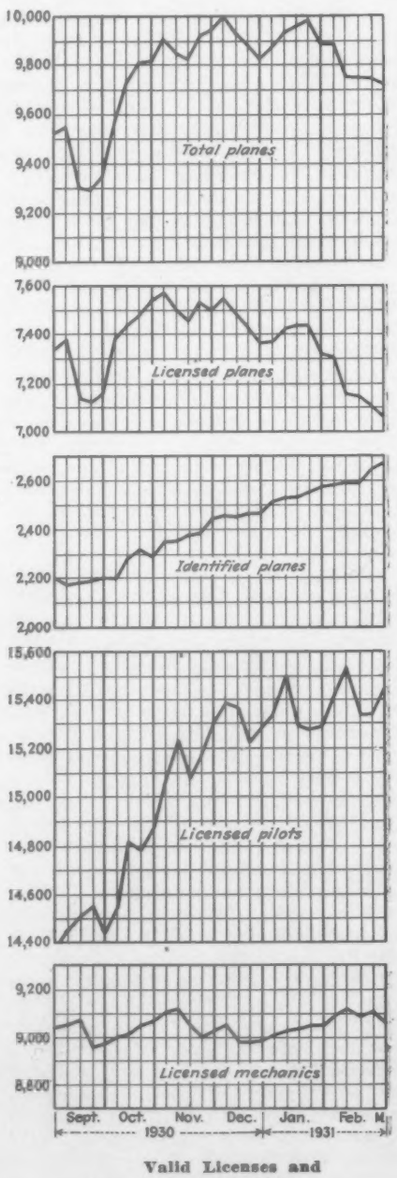
(Page 139) Permits and license applications

THE seasonal curves of student permits newly issued follow an almost identical course during the last three months of 1929 and 1930. In 1931, however, the curve drops to about 30 per cent below that of the preceding year. The current issuance of pilot licenses continued from 20 to 30 per cent below the figures for the two preceding years until February. Then both curves began the up-grade which is typical of this season of the year.

(Page 138) Valid licenses and identifications.

The effect of the 10,000 line on the curve of total planes legally approved for service is remarkable. Once in the past six months that goal was won and lost, but after a vain attempt to repeat the achievement the curve wavered and descended, as it continues to do. Licensed planes are mainly responsible for this course. Their numbers have been decreasing since early in November of last year, while the number of identified planes has been increasing at an almost constant rate.

The curve of licensed pilots is consistently erratic. During the first weeks of each month there has been a high rate of increase, with an almost equally steep descent after the second week. The general trend of the curve, how-



Valid Licenses and Identifications

ever, shows a steady increase in licensed pilots. The curve of licensed mechanics, on the other hand, continues confined within narrow limits. The latest total is only slightly above that of last September, and the variation has not been more than a hundred in either direction at any time since then.

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AIR MAIL AND TRANSPORT

(Page 151) Transport Operations and Total Flying

ON the curve, "Passengers Carried," the figure for 1930 represents only the first nine months of the year. The final report for the year has not yet been received.

(Page 153) Mail Carried by Routes

Final reports of air mail service for November and December have been received, making it possible to give corrected totals for 1930. The estimates for these months were so accurate that little change is seen in the totals for the whole service. Though most of the route totals are changed slightly those for the newly established trans-continental routes show the greatest variation. The miles actually flown on the Atlanta-Los Angeles and the New York-Los Angeles routes were 2 and 5 per cent, respectively, in excess of the figures given in the statistical issue. Returns for the Chicago-Dallas route were also larger, but by scarcely 1 per cent.

FOREIGN ACTIVITIES

(Page 173) Foreign Subsidies and Appropriations

Argentina (1930-1931)

Total for civil aeronautics	$166,000
Total for military aeronautics	814,000

Austria (calendar year 1930)

Direct transport subsidy	$299,000
Total for civil aeronautics	464,000

Ecuador (1930)

Total for civil aeronautics	$26,000

(Page 174) Annual Airplane Mileage in Air Transport, 1930

Argentina (military)	461,000
Chile	462,000
Mexico	1,645,000*
Yugoslavia	119,000

*This includes holders of U.S. mail contracts previously excluded from Mexican figures.

(Page 177) World Distribution of Airports, Airplanes and Licensed Pilots.

Austria

Total planes	43
Planes in transport service	12
Civil pilots	50
Aircraft produced	8

Chile

Civil pilots	26

Ecuador

Airports	2

Yugoslavia

Total planes	5
Civil pilots	3

Mail Carried by Routes for 1930

(Page 153) Mail Carried by Routes. Corrected totals for 1930

	Miles of service—Scheduled	Miles of service—Actually flown	Total weight of mail dispatched (Pounds)	Amount paid to contractor	Average compensation per mile flown
1. Boston-New York	197,013	178,540	120,282	$221,444.72	$1.24
2. Chicago-St. Louis	413,920	373,696	61,370	208,138.02	0.56
3. Chicago-Dallas	1,495,333	1,360,641	435,938	1,211,096.39	0.89
4. Salt Lake City-San Diego	968,641	930,617	857,757	1,592,309.86	1.71
5. Salt Lake City-Seattle	1,039,077	970,491	283,289	903,375.19	0.93
8 Seattle-San Diego	836,102	814,821	288,512	718,798.85	0.88
9. Chicago-St. Paul	1,027,596	985,688	225,104	650,317.52	0.66
11. Cleveland-Pittsburgh	207,939	191,057	65,012	172,227.91	0.90
12. Cheyenne-Pueblo	151,338	141,704	89,399	81,105.46	0.57
16. Cleveland-Louisville	271,874	248,296	79,548	113,261.23	0.46
17. New York-Chicago	1,429,272	1,268,619	1,693,253	1,375,886.98	1.09
18. Chicago-San Francisco	2 839,360	2,700,271	2,075,609	3,806,979.54	1.40
19. New York-Atlanta	1,181,664	1,066,705	461,786	1,348,208.63	1.26
20. Albany-Cleveland	285,743	258,792	64,274	92,517.37	0.36
21. Dallas-Galveston	234,834	220,686	36,410	107,009.73	0.49
22. Dallas-Brownsville	388,334	374,955	89,404	256,574.62	0.68
23. Atlanta-New Orleans	353,142	339,834	109,906	197,772.12	0.58
24. Chicago-Cincinnati	410,261	359,577	77,210	122,165.25	0.34
25. Atlanta-Miami	559,079	529,590	188,202	277,252.27	0.52
26. Great Falls-Salt Lake	495,453	488,028	63,499	223,594.36	0.46
27. Bay City-Chicago	661,618	601,322	184,779	287,073.85	0.48
28. St. Louis-Omaha	592,164	566,460	181,688	142,562.89	0.25
29. New Orleans-Houston	233,429	232,522	52,461	52,449.47	0.23
30. Chicago-Atlanta	688,016	624,914	123,968	125,907.60	0.20
32. Pasco-Seattle†	189,416	176,253	83,028	7,472.57	0.04
33. Atlanta-Los Angeles*	375,180	332,693	46,347	299,302.30	0.90
34. New York-Los Angeles*	456,299	378,825	48,652	147,741.75	0.39
Total	17,982,097	16,715,597	8,086,687	$14,742,546.45	$0.88

* Established October, 1930. † Consolidated with C.A.M. 5, July 1, 1930

Specification Table Errata

Glenn L. Martin D-333 Engine

IT HAS been brought to our attention that the specifications given for the Glenn L. Martin Motors Company D-333 engine in Table IV "American Engine Specifications" of the March 1931 issue of AVIATION should be revised to read as follows:

Four cylinder, in-line, inverted air-cooled; propeller drive, direct; normal rated horsepower, 120 at 2,100 r.p.m.; weight dry, 260 lb.; weight per hp., 2.17 lb.; bore and stroke, 4.5 x 5.25 in.; B.M.E.P., 136 lb. per sq.in.; compression ratio, 5.3 : 1; displacement, 333 cu.in.; height overall, 33¼ in.; length overall, 42¼ in.; fuel consumption at rated horsepower, .48 lb. per hp.; oil consumption, .010 lb. per hp.; ignition, Scintilla; carburetor, Zenith down draught; starter, S.A.E Standard flange provided; price, $1,800.

The Northrup "Alpha"

THE following description and specifications covering the "Alpha," built by the Northrup Aircraft Company of Burbank, Cal., should be added to Table II of the American landplane specifications published in AVIATION for March, 1931.

I. General: designation, "Alpha"; Approved Type Certificate No. 381; price at factory, $21,500; type, CML; number of seats, 7.

II. Power Plant: make of engine, Pww series C; total rated horsepower, 420; r.p.m. at rated horsepower, 2,000; fuel capacity in gallons, 100; normal range, 700 mi.; fuel consumption at cruising speed, 20 gal. per hr.; make of propeller, Hst.

III. Weights: wing loading, 15.3 lb. per sq.ft.; power loading, 10.6 lb. per hp.; weight empty, 2,679 lb.; payload, 1,020 lb.; gross weight, 4,500 lb.

IV. Performance: high speed, 170 m.p.h.; cruising speed, 140 m.p.h.; r.p.m. at cruising speed, 1,800; climb at sea level, 1,400 ft. per min.; service ceiling, 19,500 ft.; performance basis, Ms.

V. General Dimensions: span, 41 ft. 10 in.; length overall, 28 ft. 4 in.; height overall, 8 ft. 6 in.

VI. Areas (sq.ft.): wing, 295; aileron, 20; fin, 8.4; rudder, 7.9; stabilizer, 27; elevator, 14.9.

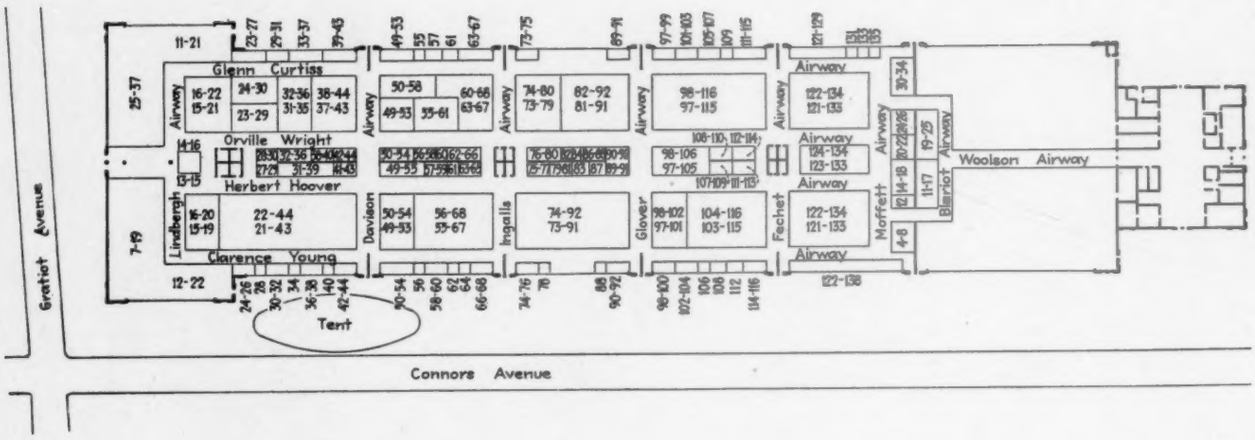
VII. Wing construction; spar, ribs, and covering, riveted "Alclad" sheet.

VIII. Landing Gear: type, split axle; tread, 102 in.; wheels, Bendix—32 x 6 in.; brake, Bendix; shock absorber, Oleo—steel spring; tail wheel, Pneu.

IX. Fuselage: framework, "Alclad" riveted; covering "Alclad" (monocoque); baggage compartment, 12 cu.ft.

The specifications for the "Alpha" as a seaplane are the same as those given above with the following exceptions: price, $24,150; number of seats, 6; wing loading, 16.1 per sq.ft.; power loading, 11.3 lb. per hp.; weight empty, 3,116 lb.; payload, 911 lb.; cross weight, 4,750 lb.; high speed, 165 m.p.h.; cruising speed, 135 m.p.h.; climb, 1,000 ft. per min.; service ceiling, 16,000 ft.; length, 33 ft. 6 in.; height, 10 ft. 0 in.; stabilizer area, 28.9 sq.ft.

THE NATIONAL AIRCRAFT



KEY TO MAP

GCA—Glenn Curtiss Airway
OWA—Orville Wright Airway
HHA—Herbert Hoover Airway
CYA—Clarence Young Airway
LA—Lindbergh Airway
DA—Davison Airway
IA—Ingalls Airway
GA—Glover Airway
FA—Fechet Airway
MA—Moffett Airway
BA—Bleriot Airway
WA—Woolson Airway

AIRPLANE EXHIBITORS

Aeronautical Corporation of America.....Tent
Air Transport Manufacturing Company.....Tent
American Aeronautical Corporation.....Tent
American Eagle Aircraft Corporation..49-53-OWA
Annibal Aircraft Company.....Tent
Amphibions, Inc.....55-61-OWA
Arrow Aircraft Company.....Tent
Bird Aircraft Corporation.....98-102-HHA
97-101-CYA
Bellanca Aircraft Corporation.....98-116-GCA
97-115-OWA
Boeing Airplane Company.....122-134-HHA
121-133-CYA
122-134-GCA
121-133-OWA
Breese Aircraft Corporation.....Tent
Buhl Aircraft Company.....104-116-HHA
103-115-CYA
Cessna Aircraft Company.....24-30-GCA
Chance Vought Corporation.....122-134-HHA
121-133-CYA
122-134-GCA
121-133-OWA
Consolidated Aircraft Corporation.....38-44-GCA
37-43-OWA
Curtiss-Wright Corporation.....22-44-HHA
21-43-CYA
50-54-HHA
49-53-CYA
Detroit Aircraft Corporation.....74-92-HHA
73-91-CYA
Douglas Aircraft Corporation.....Tent
Driggs Aircraft Corporation.....23-29-OWA
Fairchild Airplane Mfg. Company.....16-22-GCA
15-21-OWA
Fokker Aircraft Corporation of America.....WA
Ford Motor Company.....WA
Franklin Aircraft Corporation.....Tent
Granville Brothers.....Tent
Great Lakes Aircraft Corporation.....60-68-GCA
63-67-OWA
Heath Aircraft Corporation.....50-58-GCA
Kellett Aircraft Corporation.....Tent
Knoll-Brayton Aeronautical Corporation.....Tent
E. M. Laird Airplane Company.....Tent
Mercury Aircraft Corporation.....Tent
Mono Aircraft, Inc.....Tent
Nicholas-Beasley Airplane Company...32-36-GCA
31-35-OWA
Northrop Aircraft Corporation.....122-134-GCA
121-133-OWA
122-134-HHA
121-133-CYA
Paramount Aircraft Corporation.....Tent
Pitcairn Aircraft Corporation.....7-19-LA
12-22-CYA
Rearwin Airplanes, Inc.....Tent
Sioux Aircraft Corporation.....Tent
Sikorsky Aviation Corporation.....122-134-GCA
121-133-OWA
122-134-HHA
121-133-CYA
States Aircraft Corporation.....Tent
Swanson Aircraft Company.....Tent
Stearman Aircraft Company.....122-134-GCA
121-133-OWA
122-134-HHA
121-133-CYA
Stinson Aircraft Corporation.....25-37-LA
11-21-GCA
Stout Engineering Laboratories, Inc...56-68-HHA
55-67-CYA
Taylor Brothers Aircraft Corporation.....Tent
Verville Aircraft Company.....74-80-GCA
73-79-OWA
Viking Flying Boat Company.....Tent
The Waco Aircraft Company.....82-92-GCA
81-91-OWA
West Brook Aeronautical Corporation.....Tent
Yellow Cab Airways, Inc.....Tent

AIRPLANE ENGINE EXHIBITORS

American Cirrus Engines, Inc.....84-OWA
Continental Aircraft Engine Company..90-92-OWA
89-91-HHA
Fairchild Airplane Mfg. Corporation....16-22-GCA
15-21-OWA
32-36-OWA
Glenn L. Martin Motors Company....62-66-OWA
Kinner Airplane & Motor Corporation..76-80-OWA
Lycoming Manufacturing Company....29-31-GCA
Michigan Aero-Engine Corporation.....73-75-GCA
Packard Motor Car Company.....98-106-OWA
97-105-HHA
Pratt & Whitney Aircraft Company..124-134-OWA
123-133-HHA
Warner Aircraft Corporation.....50-54-CYA
Wright Aeronautical Corporation.....16-20-HHA
15-19-CYA

ACCESSORY EXHIBITORS

Abrams Aerial Survey Corporation.....60-OWA
AC Spark Plug Company.....114-116-CYA
Aero Digest.....63-65-HHA
Aeronautical Industry.....135-GCA
Aero Supply Company.....133-GCA
Aircraft Products Corporation of America.....28-30-OWA
27-29-HHA
Airports, Aviation Engineering.....28-CYA
Air Reduction Sales Company.....58-60-CYA
Airway Age.....108-110-OWA
Aluminum Company of America.....49-55-HHA
American Gas Accumulator Company...106-CYA
The Austin Company.....83-HHA
Automotive Fan & Bearing Company.....40-CYA
Aviation.....79-81-HHA
Bendix Aviation Corporation.....122-138-CYA
Berry Brothers, Inc.....121-129-GCA
The B. G. Corporation.....87-HHA
Black and Decker Mfg. Company.....86-88-OWA
Bohn Aluminum & Brass Corporation..20-22-MA
Breese Corporations, Inc.....111-113-HHA
Buhl Stamping Company.....104-116-HHA
103-115-CYA
Canton Drop Forging & Mfg. Company...56-CYA
Champion Spark Plug Company.....109-GCA
The Cleveland Pneumatic Tool Company.....66-68-CYA
Crouse-Hinds Company.....89-91-GCA
The Detroit News.....14-16-OWA
13-15-HHA
Dow Chemical Company.....11-17-BA
Edo Aircraft Corporation.....49-53-GCA
Elgin National Watch Company.....108-CYA
Ex-Cell-O Aircraft & Tool Corporation..39-43-GCA
B. F. Goodrich Rubber Company.....4-8-MA
General Electric Company.....30-34-MA

SHOW OF 1931

By John T. Nevill

The Detroit Show coming in the wake of a major business depression, where engineering talent relieved of production pressure was released for development, looms up among the most spectacular events on the aeronautical horizon for 1931. The author analyzes trends in design as indicated by the scheduled exhibits. The show directory faces this page, and a program of events follows.

THE National Aircraft Show has become one of the important fixtures of the American aeronautical year. Coming as it does during the second week of April it might well be considered the opening of "the flying season." Always important as a meeting place for the industry, this year's Detroit show, the only one of major dimensions scheduled for 1931, should take on more than ever before the aspects of a display of really new equipment. At times in the past few years the display halls have been monotonously filled with models of proven but familiar worth, standard planes in splendid colors but none the less without news value. This year's exhibits should be remarkably fresh. At no time in the past decade has such a situation been created which so thoroughly tests the old principle that when sales and production fall off engineering development flourishes. One consoling thought will always be that a first class depression produces a good air show. Possibly it is worth it.

One does not need be prophetic to say, even as this is written, that the results at the Detroit show will reveal the industry's tendency toward light airplanes. A glance at the entry list will disclose that approximately one-half of the 94 craft now entered will come under that category. What is even more significant is the fact that the show will contain at least sixteen extra light or midget type planes of which more will be said later. There is little question that the dawn of 1931 saw some improvement in the stifling condition in which the industry has suffered for more than a year. The Detroit show will find the industry once more on an up-grade following the most disastrous business doldrum of its history. It is also important that the show will be held at the beginning of the industry's best selling season.

The National Aircraft Show, which is being sponsored jointly by the Aeronautical Chamber of Commerce, Inc., and the Aircraft Bureau of the Detroit Board of Commerce, will be the only major aircraft show during 1931. It will be held in the massive $1,000,000 hangar on Detroit City Airport, as was the Detroit show last year, and it will extend from April 11 to 19, inclusive. Ray Cooper, manager of the Aircraft Bureau, will be the manager, as for several years past.

At this writing the show's entry list includes a total of 95 airplanes entered by 50 manufacturers and 101 accessory booths occupied by as many accessory makers.

The Goodyear Zeppelin Corporation.....19-25-BA
Hamilton Standard Propeller Corporation..12-MA
Haskelite Mfg. Company.....97-99-GCA
Hill Aircraft Streamliners Company.....61-HHA
Hurley-Townsend Corporation.....64-CYA
The Imperial Brass Mfg. Company....33-37-GCA
Irving Air Chute Company.....57-GCA
Kendall Refining Company.....24-26-CYA
Walter Kiddie & Company.....112-CYA
The Leece-Neville Company.....105-107-GCA
Leland-Gifford Company.....42-44-CYA
The Linde Air Products Company.....30-32-CYA
Macwhyte Company.....131-GCA
Michigan Bell Telephone Company....90-92-CYA
National Air Pilots Association.....Annex
National Power Glider & Airplane News...78-CYA
Nicholas-Beazley Airplane Company....32-36-GCA
31-35-OWA
38-40-OWA
Norma Hoffman Bearings Corporation.57-59-HHA
The Packard Electric Company.....62-CYA
The Parker Appliance Company.....50-54-OWA
Pyle National Company.....88-CYA
Radiomarine Corporation.....107-109-HHA
Richfield Oil Corporation of New York.98-100-CYA
Shell Petroleum Corporation.....75-77-HHA
Sinclair Refining Company.....36-38-CYA
S. K. F. Industries, Inc.....41-43-HHA
Sky Specialties Corporation.....112-114-OWA
Stanavo Specification Board, Inc.....23-27-GCA
Summerill Tubing Company.....31-39-HHA
Thompson Aeronautical Corporation...42-44-OWA
The Timken Roller Bearing Co.....101-103-GCA
United Aircraft & Transport Corp.....4-18-MA
Van Dorn Electric Tool Company.....56-58-OWA
Vacuum Oil Company.....74-76-CYA
The Variety Manufacturing Company.....34-CYA
Western Electric Company.....111-115-GCA
Westinghouse Electric & Mfg. Co.....63-67-GCA
Westinghouse Lamp Company.....61-GCA
The S. S. White Dental Mfg. Company...55-GCA
Wilson Steel Products Company.....82-OWA
Wyman-Gordon Company.....24-26-MA

UNASSIGNED EXHIBITORS

Engineering Development Associates
Fleischman Transportation Company
Havenaire Corporation
Lee Machinery Company
Motometer Gauge and Equipment Company
Poyer Aircraft Engine Company
Pittsburgh Screw and Bolt Corporation
Precision Model Airplane Company
Link Aviation Trainer Company
Roosevelt Field, Inc.
Russell Manufacturing Company
Claude Sauzedde Company
Sierra Manufacturing Company
Switlick Parachute and Equipment Company
United American Bosch Corporation
Western Flying
Detroit Hydraulic Brake Systems
Stewart Hartshorn Company
Curtiss-Wright Flying Service
Seekely Aircraft & Engine Company

A total of 66 of these planes and 90 accessory booths will be located within the building proper. The remaining planes and booths will be housed in a tent placed over the huge concrete apron adjoining the structure on the east, a convenience that was resorted to after it became apparent that no amount of re-arranging would result in accommodating the overflow inside the building. Although the building is 1,014 ft. long and 200 ft. wide, and contains 200,000 sq.ft. of space, every inch of the available floor was sold within a few weeks after the application blanks were mailed out. This is a condition without parallel in American aircraft show experience. The tent will be 270 ft. long and 120 ft. wide, affording an additional 30,000 sq.ft.

Everything considered, indications are that more airplanes, new and old, will be seen upon the airport this year than was the case last year, during which time the airport averaged 1,000 take-offs daily. Air traffic regulations on the airport, although not drawn up at this time, probably will be developed along the lines employed last year. That is: (1) all traffic will be counter-clockwise; (2) a circle of at least 180 deg. must be made before swinging into the line of traffic preparing to land; (3) takeoffs will be made only from a point designated by the starter, and only at the starter's signal; (4) no acrobatics will be permited over the airport; and (5) planes taking off must clear the airport boundaries before making the first turn, which must be to the left. Stall, zoom or climbing-turn takeoffs will be regarded as acrobatics.

Free parking space for an unlimited number of automobiles will be available on city-owned property just outside the airport fence. Parking space for approximately 500 cars owned by exhibitors and show guests will be reserved within the fence. As was done last year, city authorities will co-operate by inaugurating special bus service to and from the airport, which lies on one of the city's principal thoroughfares just five miles from downtown Detroit. The various exhibitors' spaces will be laid out along aisles or "airways" bearing the names of aeronautical celebrities. Decorations will be done in yellow and green, the official show colors.

NEW models of established designs and the introduction of new planes, some of them of decidedly radical design, will be high points of the Detroit show. The midget airplane will hold a place such as it has never held in any aircraft show before. With an apparent view toward capitalizing on the private-owner, amateur-pilot market, certain of the industry have concentrated during the past year upon producing airplanes of this type. This trend will be exemplified at the show by such offerings as the American Eaglet, the Buhl Bull Pup, the Rearwin Midget, the Curtiss-Wright Junior, the three Heath models, the two Aeroncas, the Annibal, the International Arrow Head, the Taylor Cub, and others. Although somewhat heavier than those just listed, others that can reasonably be listed in the light plane class are the Driggs Skylark, the three Great Lake models, the two Bird models, the two Nicholas-Beazley entries, the Stout entries, the Curtiss-Wright Sport Trainer, the Curtiss-Wright Coupe, the Amphibion Privateer, the Consolidated Fleet, the Franklin, the Mercury, the two Mono Aircraft entries, the Sioux Aircraft entry, the Swanson entry, the States model, the Westbrook entry, the Yellow Cab entry, and the three Waco models. It is not likely that the show will contain anything larger than the Fokker F-32, although the Ford Motor Company may stage a surprise at the last minute.

ACCESSORY manufacturers have promised a number of surprises in their field, which will make that branch of the show a decidedly interesting component of the whole. The eleven aircraft engine manufacturers represented are all showing the latest models of their product. They include American Cirrus, Martin, Continental, Lycoming, Kinner, Michigan Aero, Packard, Pratt & Whitney, Warner, Szekely, and Wright.

As this is written it seems likely that the show week will be declared Aviation Week by an official proclamation from Mayor Frank Murphy, of Detroit, and that the days of the week will be designated in honor of certain classes of persons who attend. A glider demonstration, such as was carried out last year, will take place on Tuesday, April 14, between 2 and 4 p.m. Other events of the program are as shown at the left.

The National Aircraft Show is being arranged for by a Board of Control of four men representing both the Aeronautical Chamber and the Aircraft Bureau of the Detroit Board. Edward S. Evans, president of the Detroit Board of Commerce, is chairman, and John R. Cautley, of the Bendix Aviation Corporation, South Bend, Ind., vice chairman; Col. Phil. G. Kemp, of Chicago, and G. Hall Roosevelt, of Detroit, the two remaining members.

Highlights of the Program

(Saturday, April 11)

1:00 p.m.—Inspection of show by board of control.

2:00 p.m.—Opening of pre-view for invited guests.

7:00 p.m.—Opening of show to public.

(Monday, April 13)

a.m. and p.m.—Maintenance sub-committee, Air Transport Section, Aeronautical Chamber of Commerce, Hotel Statler.

(Tuesday, April 14)

10:30 a.m.—Second Annual Conference on Aeronautical Education, Hotel Statler.

a.m. and p.m.—Operations committee, Air Transport Section, Aeronautical Chamber of Commerce, Hotel Statler.

10:30 a.m.—Executive committee of Accessory-Materials section, Aeronautical Chamber of Commerce, Hotel Statler.

2:00 p.m.—Glider demonstration at airport.

(Wednesday, April 15)

a.m. and p.m.—National aeronautic meeting of the Society of Automotive Engineers, "Engines, and Aircraft Fuels." Book-Cadillac Hotel.

10:30 a.m.—Second Annual Conference on Aeronautical Education, Hotel Statler.

6:30 p.m.—Dinner and meeting, Detroit Section, A.S.M.E. "Influence of Recent Legislation on Commercial Air Transport." Irving Glover, Detroit Engineering Societies Building.

(Thursday, April 16)

a.m. and p.m.—National aeronautic meeting of the S. A. E. "Amphibions and Seaplanes, Aircraft Design, Aircraft," Book-Cadillac Hotel.

6:30 p.m.—S. A. E. Banquet, Grand Ballroom, Book-Cadillac Hotel.

A PRE-VIEW OF THE DETROIT SHOW

Manufacturers throughout the industry are engaged actively at the present time in adding finishing touches to new models of airplanes and engines and latest developments in accessories and materials for display at the Detroit Aircraft Show. In most cases plans have been made well in advance but a few exhibitors are always uncertain about finishing their latest creations in time for the opening date, still others have been late in applying for space and may not be accommodated. Considering these circumstances we are attempting to present the plans for the show as accurately as possible in advance of the opening.

FROM the plans of the group of exhibitors at the Detroit Aircraft Show it is possible to glean some impression of the ideas of the manufacturers, if not of the actual trend of the industry.

Of prime importance is the indication that the light airplane has ceased to be a curiosity and become an integral part of the industry. There remains some question as to whether it is to be a one-place or a two-place machine. Although several pioneer light plane manufacturers are adding two-place machines to their lines they are still continuing to manufacture the single-place planes.

In any event, the light-plane movement seems to have pointed the way to lower horsepower per person in the group of airplanes of three and four passenger capacity. This is a very recent development.

Although no numerical study has been attempted, show plans seem to show a large proportion of amphibions among the exhibits.

At least two of the new airplanes at the show will be cabin biplanes, indicating a possible revival of the type.

It is difficult to discuss detail improvements in advance of the show, but indications are that many refinements have been made with the idea of simplified maintenance in the background.

Airplanes

EXEMPLIFYING the trend of the light airplane from single to two-place type, the American Eagle Aircraft Corporation and the Aeronautical Corporation of America will exhibit new models designed for two passengers. The two-place Eaglet is powered by the 30 hp. Szekely engine, while the two-passenger Aeronca, known as the Duplex C-3, is a side-by-side machine, powered with the Aeronca E-113 engine of 35 hp. Both airplanes are similar in general design characteristics to their predecessors. The Aeronautical Corporation of America will also exhibit the DeLuxe C-2 Aeronca, which is a new version of their older model.

Several minor modifications have been made in the "Privateer" Series 2 amphibion, under production by Amphibions, Inc., since it was described in a recent issue of AVIATION. Chief among them is an improvement calculated to reduce the maintenance on the tail wheel unit. Substitution of a small pneumatic tire 20 in. x 3 in. for the solid rubber and bakelite tail wheel with spring arrangement has been made, eliminating the sliding spring mechanism without impairing the handling qualities on the water. Incidentally, the large wheel also has a certain rudder effect in the water.

Four airplanes, including the single-engined Cyclone-powered Airbus will be shown by the Bellanca Aircraft Corporation. Although the Airbus has been seen on a number of fields during the past year, it has never before been exhibited at a major aircraft show. The standard Pacemaker landplane, equipped as a passenger carrier, and the same model fitted as a special photographic airplane will be included in the exhibit. The remaining machine is the six-place, Wasp-powered Skyrocket.

A very interesting exhibit has been planned by the Bird Aircraft Company, which has been devoting its efforts to relatively low powered but efficient biplanes having good production characteristics. In addition to the familiar three-place model, powered with the 100 hp. Kinner engine, the new four-place biplane powered with the 125 hp. Kinner will be shown. The feature of the exhibit will be a five-place cabin biplane, powered with the 125 hp. Kinner and selling for $4,995. This machine is structurally conventional, but has a fuselage built in the form of an airfoil section, from which a certain amount of lift is expected. To facilitate production, the

wings of all three models employ the same panels, which are of constant chord.

One of the most interesting of the new light planes from a production standpoint is the Buhl "Bull Pup," a single-place open mid-wing monoplane powered by the three-cylinder Szekely engine. This machine embodies the use of a monocoque all-metal fuselage, the first of its kind in the light plane group, and offers significant production possibilities. It is described briefly on page 249 of this issue. A single engine cabin monoplane will be displayed by the Breeze Aircraft Company. The Consolidated Aircraft Corporation will show a Fleetster Model 17, cabin monoplane, the latest design of Fleet biplane, and a new three-place machine.

THE entire new line for 1931 of the Curtiss-Wright Airplane Company will be exhibited. This group includes the Junior, powered by the Szekely engine; the Gypsy-powered Coupe, and Travelair sport trainer, all of which have been described in this and previous issues of AVIATION. The other airplanes for display in this group are the Curtiss-Wright Sedan, four-place high wing monoplane, with the Curtiss Challenger engine; the Travelair six-place cabin monoplane; the Curtiss-Kingbird and the Keystone Commuter.

Historical interest and mechanical detail will characterize the presentation of the Wright Aeronautical Corporation Division. The historical aspect will lie in the display of air-cooled engines from the two-cylinder Lawrance through the Whirlwind J-4 engine used by Commander Byrd to the very latest model of Cyclone R-1750-E. This most recent Wright product, which embodies many refinements including a new spark plug cooler and an improved exhaust system, will be shown in sectionalized form. These detailed improvements will also be demonstrated separately. A dummy Cyclone Model 1820 engine will complete the presentation as applied to the Cyclone type. A J-6 nine cylinder engine, modified to the E type and sectionalized and a 760-D engine converted to the E type will be included. In addition to these, two conventional Gypsies, a geared Conqueror and two Challengers, one a dummy and the other sectionalized will complete the exhibit.

Most recent developments in the products of Detroit Aircraft Corporation will be displayed, including the six-place Ryan Brougham, a five-place Lockheed Vega, the two-place Lockheed Sirius with its retractable landing gear, and the amphibion version of the Eastman flying boat. One model previously unannounced is to be included.

Marking the entry of the Douglas Aircraft Corporation into the commercial field a new and interesting amphibion is to be presented. Known as the Dolphin, it has a passenger capacity of six to eight persons and is powered by two Pratt & Whitney Wasp engines mounted above the wing. It is characterized by a relatively small auxiliary wing surface, placed above the wing. The Dolphin is described in some detail in this issue.

A number of modifications have been made in the 1931 model Skylark, to be exhibited by the Driggs Aircraft Corporation. A redesigned nose completely cowling the engine and contributing both to appearance and aerodynamic efficiency has been incorporated, a steerable tail skid is furnished as standard equipment and the baggage compartment has been moved from the rear to a position forward of the front cockpit.

A high-wing monoplane, having a passenger capacity of two persons, and powered with the Rover engine will be exhibited by the Fairchild Aviation Corporation. This machine is the most recent product of the Kreider-Reisner division of the Fairchild organization, and will be rushed to completion for the show.

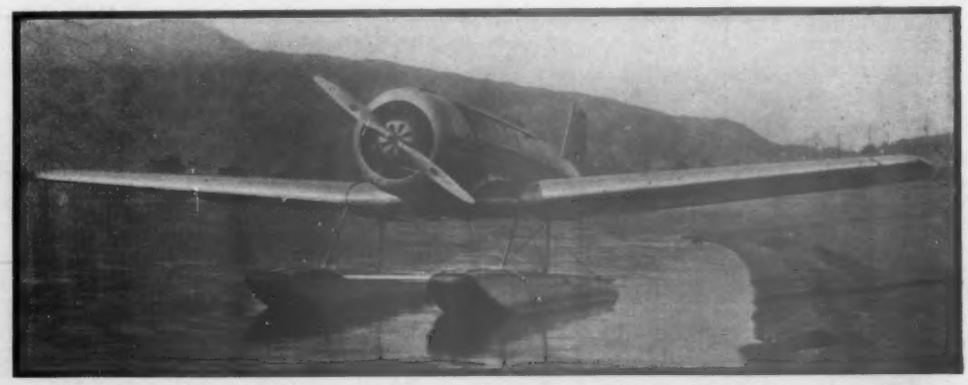
Probably the only ambulance plane on display will be that shown by the Fokker Aircraft Corporation, Division of General Motors Corporation. This machine is a redesigned F-14, powered with a Cyclone engine and intended for Army ambulance service. Another modification of the F-14, a single-engined transport seating nine passengers and having a wing mounted on the fuselage instead of the parasol mounting of the original F-14, will also be shown. The power plant for this machine is either the Hornet A or the Cyclone engine. The exhibit will be completed by an F-32, equipped for regular transport service.

Three and possibly four airplanes will be arranged in the space of the Ford Motor Company, Aircraft Division. While at the time of writing, it is not definitely determined which three models will be shown, it is expected that there will be one club plane, a seaplane, and a single-engined freighter, the last of these mentioned being of the most recent design.

A two-place biplane of orthodox design, powered by the 90 hp. LeBlond engine, will be shown by the Franklin Aircraft Corporation, Franklin, Pa.

In a 20x40 ft. space, a 10 ft. model airship and a model hangar will be displayed by the Goodyear Zeppelin Corporation. The model hangar will represent the dock in which the Akron is now being built, and will have doors in operation showing the nose of the ship moving in and out. A full size 16-ft. airship propeller and various items of technical equipment will be exhibited. The booth will be bounded by a railing constructed of girders representing the type used in the construction of the large airship.

Passing to a higher power range, Granville Brothers Aircraft, Inc., is planning to show the new Senior Sportster, latest and largest of the Gee Bee line, and powered by the 300 hp. Wasp Junior. It is the aim of



Float equipment as installed on the Northrop Alpha.

the manufacturers to provide a two-passenger airplane of the Gee Bee type having even higher performance than its one-place predecessors. Its characteristics are identical with those of the earlier models.

In addition to the two-place Sport Trainer and one-place Sport Special biplanes, the Great Lakes Aircraft Company will display its "Trainair," pilot training device. Both models are American Cirrus powered.

An exhibit more elaborate than those of previous years is planned by the Heath Aircraft Corporation. Three single-place monoplanes, powered with Heath engines and of parasol, center wing, and low-wing design, will be included and a fourth also may be added.

A four place, Kinner powered Bird biplane.

MUCH interest has been aroused over the proposed display of various types of autogiros. Two exhibitors, the Pitcairn and Kellett Companies, are planning to feature this type of machine. The Kellett machine which may be shown is the result of two years of research and experimental work and is a two-place side-by-side, dual control type, having a 165 hp. engine and designated "Kellett K-2." The Pitcairn machine, somewhat more familiar, will be shown in its most refined form.

Two models of a new amphibion known as the "Sachem" will be introduced by the Knoll-Brayton Aircraft Company, of Norwich, Conn. The designer is Felix Knoll. Recent developments will be exhibited by Mono Aircraft, Inc., and the Nicholas-Beazley Airplane Company will show a three-place open low-wing monoplane, designated NB-4, and a new high-wing machine.

A two-place side-by-side open low-wing monoplane will be exhibited by the Paramount Aircraft Corporation and a high-wing midget monoplane, powered with a 40 hp. three-cylinder Poyer engine will be displayed by Rearwin Airplanes, Inc. The new Warner Scarab Junior-Kari-Keen, two-place cabin monoplane, has been entered by the Sioux Aircraft Corporation.

A two-place open monoplane will be displayed by the States Aircraft Corporation and it is possible that one other machine may be included in this exhibit. The Swanson Aircraft Company will show its two-place cabin monoplane Coupe, described on page 250 of this issue.

The Lycoming powered Stinson Airliner, on the field at Detroit last year during the show and since used by a number of transport operators, will be offered together with the four-place SM-8A Junior and four-place SM-7B Junior. One of the features of the Stinson exhibit is to be the new five-passenger twin-engined cabin monoplane amphibion which was brought out recently.

Two interesting designs, probably including the Buckley all-metal low-wing cabin monoplane and a machine of Stout design will be shown by the Stout Engineering Laboratories, Inc. Featuring the 40 hp. Continental engine, Taylor Brothers Aircraft Company will exhibit the one-place open monoplane, "Cub."

Visitors at the National Air Races last year will recall the Verville Trainer which is to be exhibited at the show. In addition to the Trainer, the Verville display will comprise a standard Air Coach and one other airplane.

Departing from the policy of the United Aircraft and Transport at Detroit last year, this company is planning to group the displays of its subsidiaries, forming one of the largest presentations of the exposition.

The Pratt & Whitney Division will contain six engines showing all of the recent refinements in the line, and including the 300 hp. Wasp Junior, the Series C Wasp, and the Hornet which, on a recent 300 hr. test-stand run, developed 660 hp. at 2,100 r.p.m.

The airplane sections of the exhibit will be on either side of the Pratt & Whitney display and will include a Wasp Corsair and a Wasp Boeing P-12, as well as the new Hornet-powered Sikorsky S-41.

Executive travel and survey, including sleeping accommodations will be the feature of the Sikorsky S-41 amphibion built for Mr. E. W. Backus. The cabin arrangement of this machine has been designed to provide sleeping accommodations for four persons on extended expeditions. The forward compartment provides accommodation for two additional persons.

Two airplanes, one a new model, will be exhibited by the Northrop Aircraft Corporation division of United Aircraft. These are to be the familiar "Alpha" six-passenger light transport and the new "Beta," a two-place open cockpit, low-wing monoplane powered with the Menasco six-cylinder inverted in-line engine.

The Stearman division will show two airplanes, one the Wasp-powered "Speedmail" and the other the "Advanced Trainer" with the 300 hp. Wasp Junior.

Another feature of the exhibit will be the introduction of the new adjustable pitch propeller by Hamilton-Standard Steel. A conventional type of propeller having hollow steel blades with the pitch adjustable on the ground will be available for inspection, and the most recent developments in magnesium blades will be featured in the exhibit.

The transport section will feature the operations of the Boeing System, National Air Transport, and the Varney Air Lines.

Two new models are to be shown by the Waco Aircraft Company in addition to the present series Model-E, which will be on view but has not undergone any consequential changes. One of the new machines is the Model-F-2 powered with the Continental A-70 Series 2, 165 hp. engine. This is a development of the present F Series The other is a four-place cabin biplane, also with the Continental A-70.

An airplane manufactured by the Westbrook Aeronautical Corporation also is to be shown and has been described in a recent issue of AVIATION.

Among the other light plane manufacturers who will exhibit are the Yellow Cab Airways, the Annibal Aircraft Company and the International Arrowhead.

Exhibit plans have not yet been announced by the Air Transport Manufacturing Company, American Aeronautical Corporation, Arrow Aircraft Company, Cessna Aircraft Company, E. M. Laird Airplane Company, and Mercury Aircraft Company.

Engines

DETAIL refinement and reduction of total weight are the characteristics of the new Continental Model A-70 engine which is to be shown at Detroit. The weight reduction of the entire unit is in the neighborhood of 10 per cent. A number of the detailed improvements have been made in this engine to facilitate maintenance. One of these is a quickly detachable rocker box cover which requires no safety wires and is grease tight and secure. The exhibit will also, of course, include the new Continental A-40 four cylinder, opposed light plane engine.

Improved models of the Kinner B-5 125 hp. engine and the C-5 210 hp. engine are to be included in the display of that company at Detroit. Improvements also have been made in the method of enclosing the valve mechanism assembly in this engine. The new push rod housings are of aluminum, felt lined, and are quickly removable for easy accessibility. Dust and oil tightness are claimed for the arrangement. The familiar Kinner K-5 will also be shown. In addition to this portion of the exhibit, a cut-away model of the B-5 engine will be available for inspection. A new development in the K-5 is the front exhaust.

An inverted "Vee" 12-cylinder air-cooled engine will be introduced by the Fairchild Company, Engine Division. This power plant is expected to develop 275 hp. at 2450 r.p.m. The two banks of cylinders are similar in construction and dimensions to the single bank of the six cylinder Fairchild engine which also will be displayed.

A completed radio shielded R-680 engine is to be displayed by the Lycoming Manufacturing Company. Another engine of the same model with one-quarter section cut away in the left side of the accessory housing will be available to demonstrate the functioning of the induction system. A part of this engine will be finished in natural metal, without benefit of enamel or extra polishing in order that the visitors may see the parts in their original state.

The Glenn L. Martin Motors Company, formerly Chevrolet Aircraft Corporation, will exhibit the Martin Model 333, four-cylinder in-line engines, together with parts and photographs of typical installation.

In view of the recent light plane movement, the products of the Szekely Aircraft and Engine Company have become increasingly used. The SR-3, Model L and the SR-3, Model O, slow speed types, operating at an average speed of approximately 1,600 r.p.m., are to be presented.

The exhibits of American Cirrus Engines, Inc., Michigan Aero Engine Corporation, Packard Motor Car Company, and Warner Aircraft Corporation are essentially the same as last year. Plans for the exhibit of the Wright Company and Pratt & Whitney Company have been discussed previously in this article under their various holding companies.

Accessories

WHILE no attempt can be made to predict the content of a number of the accessory exhibits, we devote the remainder of this article to those who have informed us of their intentions at the time of writing. All other exhibitors will be listed elsewhere in this issue.

An elaborate exhibit is being planned by the Aluminum Company of America showing in an instructive way the many applications of its products to all branches of the aeronautical industry. Also included in the material group of exhibitors, will be the Dow Chemical Company, showing the latest advances in the uses of magnesium.

Complete airport engineering and building service will be illustrated and described in a motion picture film to be shown by the Austin Company and featuring the Austin canopy type of hangar door. A number of photographs of Austin-designed airports and structures will be on display. Airport lighting equipment will be shown by Crouse-Hinds, Pyle National and General Electric.

A selective tail wheel control which allows the pilot to steer the tail wheel when desired and to release it so that it may caster in a 360 deg. circle, is to be a feature of the display of the Automotive Fan & Bearing Company. This exhibit will also include a line of aircraft wheels and brakes as well as tail wheels for low pressure tires. A shock strut specially developed for low pressure tires, and standard interchangeable stick and wheel controls will also be displayed.

The Bendix exhibit will occupy spaces 122 to 138 inclusive on Young Airway, and will include Bendix wheels, Eclipse starters and generators, Stromberg carburetors, Pioneer instruments and equipment, Scintilla magnetos, Delco electric and ignition apparatus, Friez weather instruments and Paragon propellers.

The form of presentation adopted by Berry Brothers at former aircraft shows has been developed and expanded and will include an extremely complete exhibit of small scale models of airplanes. Airplane manufacturers are co-operating with this company in the matter of submitting accurately constructed scale models.

Various sizes and types of shock absorber struts will be exhibited by the Cleveland Pneumatic Tool Company and, as in the past, the group will include a wide range of sizes for a variety of purposes.

The exhibit of the Edo Aircraft Corporation will be arranged very much along the lines of last year and will

Two-place, side-by-side seating will characterize the new Aeronca

consist of one Model 6075 float, a pair of model 1525 floats, supported above the heads of the spectators to facilitate inspection of the bottom, a large cutaway section showing standardized construction, a collection of photographs, and a motion picture film. Probably the most significant feature of this exhibit will be the installation of the new type water rudders on the floats. This development is described on page 251 of this issue. The model 6075 float is similar in a general way to its predecessors. The form of the flutes, however, has been altered somewhat and the "vee" of the bottom increased from 20 deg. to 30 deg. deadrise. The typical square stern is retained, but the area of the stern has been reduced and the float instead of having parallel lines in the plan view, is of streamline shape.

Electrification of aircraft instruments, as usual, will be the theme of the General Electric exhibit. The latest developments in remote control and remote indicating devices will be demonstrated.

Recent developments in parachute design have led to the presentation of the quick release harness which is to be featured by the Irving Air Chute Company, Inc. This device retains all of the features of the standard harness, but can be instantly released in landing over water by turning an ingenious holding device through an angle of 45 deg. and pressing in on it. Another development calculated to increase the comfort of parachute-wearing passengers is the Irvin Airplane Chair. This device is a normal airplane chair with respect to weight, cost, and comfort, with a small fitting back pack hidden beneath the upholstery and remaining there at all times. In appearance the unit resembles a normal chair, except for the special harness extending from beneath the upholstery. Upon seating oneself the arms are thrust through the harness, which is all that is necessary to render the parachute ready for use. Parachute exhibits by the Russell and Switlick Companies are also planned.

The five-cylinder C-5 Kinner, developing 210 hp.

The Hahn radio shielded spark plug, the Lux fire extinguishers for airplanes, and the line of Lux portable fire extinguishers for airports will be included in the display of Water Kidde & Company.

A complete range of ball roller and truck bearings for aircraft application will be shown by the Norma-Hoffmann Bearing Corporation. Special application developed during the past year for control pulleys, instruments and other uses will be portrayed. SKF Industries and the Timken Roller Bearing Company will also be among the bearing exhibitors.

A new development in the spark plug field is the Hurley-Townsend "copper cooled" plug, designed by Roy T. Hurley. The large center electrode is surrounded by a copper tube which conducts heat away from the nose of the plug. Laminated mica installation is used and the copper tubing is expanded during manufacture and forced firmly against the mica to produce tightness. Other types of plugs wil be shown by The B. G. Corporation, and the Champion Spark Plug Corporation.

Hamilton-Standard adjustable-pitch propeller.

Application of aircraft lighting and ignition cable, both plain and radio shielded, will be illustrated by the Packard Electric Company. A feature of this exhibit will be the No. 844 shielded ignition cable and a new elbow fitting which has been developed to fit into the standard Scintilla shielded magneto covers. This fitting is compact, yet provides a separate ground for each cable coming into the magneto and any single cable can be removed easily without disturbing the other wire. The shielding recently developed by the Breeze Company and described elsewhere in this issue, also will be shown.

In addition to the most recent model of Heywood starter, the Sky Specialties Corporation will show its new rubber-covered fuel and oil line tubing.

The Sperry Gyroscope Company will exhibit its Gyro-Horizon and Directional Gyro in the booth of the American Gas Accumulator Company which will show the new Sperry-AGA 1000 mm.-arc floodlight.

A complete line of magnetos for aeronautical use, as well as generators, spark plugs, coils, switches and equipment for Diesel injection, is to be presented by the United American Bosch Corporation.

An airplane wheel and brake, designed to conform to low pressure intermediate tire requirements is to be introduced by the Variety Manufacturing Company.

Micarta products, wind and engine-driven generators, and airport lighting equipment will be among the features of the Westinghouse exhibit, and some of the products of the Airport Lighting division of this company are to be in use at Detroit City Airport during the exposition.

Several new products of the S. S. White Dental Manufacturing Company will be available including tachometer drive shaft assemblies, remote tuning controls for radio receivers, and individual moulded ear pieces.

Instructive exhibits are planned by the manufacturers of fuels and lubricants such as Kendall Refining Company, Richfield Oil Corporation, N. Y., Shell Petroleum Corporation, Sinclair Refining Company, Stanavo Specification Board, Inc., and Vacuum Oil Company. Airplane radio equipment will be shown by The Radiomarine Corporation and Western Electric Company.

The usual exhibits of forgings will be displayed by the Canton Drop Forging and Manufacturing Company and the Wyman-Gordon Company, and castings will be shown by the Bohn Aluminum & Brass Corporation.

CONTRACT AIR MAIL'S FUTURE

Postmaster General Walter F. Brown

AN INTERVIEW WITH

W. Irving Glover

Assistant Postmaster General in Charge

W. Irving Glover

FOR twelve years the mainspring of American air transport has been in Washington. It has been at the corner of Pennsylvania Avenue and 11th Street in the brownstone building that houses the U. S. Post Office. To be still more specific, the focal point of our transport development lies in the fifth floor office occupied by the Hon. W. Irving Glover, Second Assistant Postmaster General of the United States, in charge of the transportation of mail by land, sea, and air.

The Post office Department has given air transport its best financial backing. It has pioneered in airway development and in requiring the best and most modern equipment for serving the mail routes. Even last year more than 70 per cent of the total revenue of transport lines came from the air mail appropriation. The Post Office's share has often been taken for granted and so overlooked, but Mr. Glover called forceful attention to it in his testimony before the Committee on Appropriations of the House of Representatives last November.

"Mr. Chairman," said Mr. Glover, "this is a question of whether we are interested in aviation."

The chairman: "That is not the question at all. What we are interested in is not spending all the money we have."

Mr. Glover: "It is a question of whether we are interested in aviation or not and I am still egotistical enough to think that the Post Office Department has done as much for the development of commercial aviation in this country as any single agency in the government. We may have spent a lot of money. I dare say we have. But we have done more for the development of commercial aviation in this country than the Army or the Navy. The Post Office Department has done more [than anyone else] in the way of selling planes and keeping these aviation companies building planes in the business. It has developed into a real . . . business in this country. The Department of Commerce records show that; and if it had not been for the Post Office Department we would have been away up in the rear, whereas today we are standing out in front in the development of commercial aviation."

In response to the criticism from members of the committee, and especially from the chairman, Rep. Will R. Wood of Indiana, that the Post Office Department was constantly expanding air mail service at an unreasonably rapid rate and that no bounds could be set to its activities, Mr. Glover defined his position. "Gentlemen," he said, "200,000 people have flown in six months due to the development of air mail and the insistence of the Postmaster General that air mail lines should equip themselves to carry passengers. The Postmaster General said when he was here, gentlemen, 'stay with us for a couple of years more. Give the air mail operator and the passenger operator everything that the government has. Get behind it as regards weather reports, radio, and intermediate fields, and lighted airways, and I am the first one to say that after that period if the people won't fly, then the government shall withdraw from the picture.' So recently as just this last week I know that he talked with the President along that very line, that if the people would not fly after two years, after this picture was completed—and he urged to get the people to fly in the air and they are doing it—then it would be time for Congress to say this thing is a flop and no longer are we going to ask for any subsidy."

The suggestion that the Post Office Department's

support for aviation might be terminated in a couple of years under any conditions is a very disturbing one to those interested in air transport. We have sought a further interpretation of Mr. Glover's views, which possess an unique importance for the operators of airlines and the stockholders of transport companies. We have obtained it.

The office of the Second Assistant Postmaster General is full of reminders of the air mail. A map of routes in operation or in prospect blankets most of one side of the room. A model of one of the early air mail planes hangs from the ceiling. Among the wall decorations are posters advertising the air mail service, and the original of the cartoon of the Post Office leading air transport which appeared in AVIATION last January.

"The air mail," Mr. Glover begins, "is steadily gaining headway with the American people. It is not yet fully understood. It is still being misused in some cases. But instances of misuse are growing rarer and the amount of mail handled is steadily increasing. The total postal receipts for all classes of mail matter dropped off in every month of 1930, as compared with 1929. In some months they were off as much as 14 per cent. But in every single month the air mail showed a gain over the previous years poundage, averaging better than 10 per cent. I expect that to continue. I see no reason why it should stop.

"But another set of questions is raised by the mixture of mail and passenger business. It is there that uncer-

Left: E. B. Wadswaite, superintendent of air mail.
Right: Chase C. Gove, assistant to Mr. Glover

tainty exists. From our point of view passenger transport by air is on trial. We are prepared to continue that trial for a couple of years. If we do not then consider that it has justified itself, we shall go back to the air mail as a separate undertaking, served by fast open cockpit planes without thought of passenger accommodation and paid for only at a rate which will cover the actual expenses of operating—a rate considerably lower than those now in force.

"In the meantime operators will have to face the prospect of rate reduction. Within the past two weeks [Mr. Glover was speaking on March 6] we have had a conference of air mail operators which has resulted in a revision of rate schedules and a reduction of $2,000,000 in the gross payments required for the present service, and that is only a beginning, for we must progress toward greater economy.

"It is my own belief that on many routes the intermingling of passenger and mail operators is essential in order that the passenger traffic may be handled at all on any reasonable terms. There are other cases in which passenger business can stand alone and we view their development and addition to their number with the greatest interest. The Ludington line is a notable instance of the maintenance of successful and regular service without postal assistance, but the Ludington line operates on an exceptionally favorable and well-traveled route. Mr. Cord is reported to have others in mind in the Midwest. There are others within my own knowledge that have not been undertaken. I am thinking particularly of the possibilities between the cities of the Mohawk Valley, Buffalo, Rochester, Syracuse, and Utica, and New York. Few people realize that there is a larger passenger traffic over that route than between New York and Washington.

"These passenger operations are economically administered. They have to be. I believe that in some respects they set a good example which will make some of our present mail contractors wake up and reconsider their own policies. At present there is too much duplication of facilities. Parallel lines are maintaining separate airports, separate ground organizations where they might with advantage co-operate; even separate ticket offices. We decline to provide a financial prop for deliberate extravagance.

"That is our position. I have always been an enthusiastic believer in air transport as developed through the use of air mail contracts and I still am. I am an optimist for the future, but the future is not going to take care of itself. There is plenty of hard work ahead of us."

AND what, the interviewer asked, did Mr. Glover think of the prospects of changes in the air mail route map as now constituted?

"We are not going to try to extend air mail to every village in the United States. We want to concentrate on routes which prove the existence of a substantial traffic and give them a really first-class service. By the time that we have provided the routes covered in the current appropriation bill and one or two others, we shall feel that the map is sufficiently filled in. Thereafter we expect to concentrate efforts more upon improvement of service and increasing the frequency of service than upon drawing more new lines across the small vacant spaces."

How about air mail for the overseas possessions?

"So far as Hawaii goes, there are no funds available and nothing could in any case be done until an item has been inserted in some future appropriation bill to cover it. In Alaska there is a peculiar situation, which has forcibly illustrated the value and economy of air mail service in out-of-the-way regions. We have recently advertised for star route service on 26 routes within Alaska (not including any connection between Alaska and the United States). The terms of the advertisement did not specify the means of conveyance of the mail. They called for regular and efficient service at minimum cost, and the contractor could operate with dog sleds, or caterpillar tractors, or anything he liked. As a matter of fact, however, two bids received undertook to provide aerial service on terms more favorable than could be obtained with any other conveyance, and contracts will be awarded. They will not be air mail contracts in the ordinary sense. They will be ordinary mail contracts, and the operator will use the airplane because he finds it the most suitable."

THE SHOW FROM THE SALES MANAGERS' VIEWPOINT

IN THE long run national exhibitions in any industrial field can justify themselves only as they are successful in effecting sales of the products exhibited. As individuals primarily responsible for sales policy, the sales managers of exhibiting organizations have a very direct interest in the conduct of any show. In order to obtain an expression of opinion from this group, with reference to the forthcoming National Aircraft Show, a letter was circulated suggesting discussion of certain specific phases of show management which have been subject to controversy in the past. A gratifying number of replies were received from representative officials, including corporation presidents, general managers, etc., as well as sales managers. On many points more or less positive agreement has been reached, but there are others that still show wide differences of opinion.

To provide a set of rails on which the discussion could run, ten topics were outlined in the circular letters.

1 Where should the special appeal of an aircraft show be directed? Should it be aimed at the local public as potential retail buyers, at dealers and distributors and those who are already professionally operating aircraft, or at securing a generally favorable nation-wide publicity?

2 There should be a certain harmony in the general appearance and manner of the show. Already on some occasions the request has officially been made that all salesmen should be in evening dress after the dinner hour. Is this a good plan? Should the atmosphere of the exhibition be that of the flying field, or of the drawing room, or should some other standard be set?

3 Is it desirable to call the attention of visitors to the structural details of an aircraft, or should attention be concentrated on the machine as a completed whole? Specifically, should cutaway models, wings with the fabric removed, etc., be shown?

4 Is it desirable that the visiting public be allowed a rather free hand in fingering and climbing upon the exhibits, or is it advisable to set the exhibit upon a throne, so to speak, and keep the onlookers at a respectful distance by a silk cord?

5 Is it well to be very generous with flying demonstrations during the show, keeping demonstrating machines going steadily to build general good will, or is it better to limit it to those already actively engaged in aircraft operation or otherwise known to be exceptionally good prospects for early purchase?

6 Should elaborate catalogs be freely distributed at the exhibit, or is it better to confine the publicity matter there to simple leaflets?

7 Where prices are given should they be F.O.B. or F.A.F. prices, or prices delivered in the locality where the show is held? This has, of course, been the subject of much dispute in the automobile industry.

8 When new models or new prices are announced at a show is it advisable in view of all the recent talk about price cutting prospects and cheap airplanes to relieve price timidity on the part of the possible purchaser by guaranteeing maintenance of price for six months or some other substantial period? This again has been a matter much discussed in automobile circles.

9 What should the attitude of the exhibitor be toward the invasion of the show by great numbers of school children? Should they be kept at arm's length, or welcomed into the stand and given unlimited quantities of printed matter?

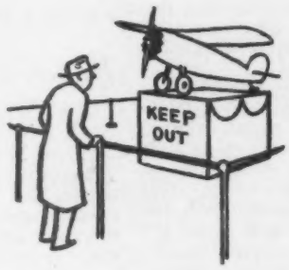
10 Should the aircraft industry normally bring out annual models at show time, keeping them secret until the opening of the show or a few days before as the automobile industry used to do, or should it break away from the annual model and make improvements and announce novelties at irregular intervals, as the automobile manufacturers plan to do at present?

That these questions were pertinent was evidenced by the time and thought obviously given to their discussion. Excerpts from many of the letters are published in the following pages and all of them have been tabulated in detail as a basis for the formulation of a group opinion on each subject. Thirty-one replies were received, all of which with few exceptions treated each of the ten questions fully.

It was fairly well agreed that the special appeal of the show should be as broad as possible, and its publicity national in character. Only four of the sales managers would place the primary emphasis on the immediate local

market and one rated dealer and distributor appeal as paramount. The general opinion rated the importance of appeal as to (1) general public, (2) operators, (3) dealers and distributors, and (4) local markets in order.

An interesting divergence of opinion appears in the discussion of show atmosphere in general, and of evening dress for salesmen in particular. Thirteen replies favored, and fourteen were opposed to the general adoption of evening dress by show attendants. One person believed it to be a matter of judgment with each exhibitor and three did not express opinions on the subject. It was generally agreed, however, that the day of the helmeted and booted salesman was over, and that the appearance and conduct of the show personnel should promote the idea of aviation as a normal business enterprise, rather than as a side show.



That cutaway models and exposed structural details have great educational value is admitted, but only thirteen of the 31 letters received were definitely in favor of their inclusion in the show exhibit. Ten were opposed to their use, believing that they detracted from an exhibit as a whole,—six would leave the matter entirely to the discretion of the exhibitor,—and two refrained from expressing any opinion. It is interesting to note that diametrically opposite opinions are drawn from the same set of conditions,—in one case exposed structures being favored because they show the real strength of construction, and in another case opposition is based on the fact that cutaway models expose apparent frailty to large groups of persons whose engineering education does not permit them to discriminate between good and bad design. It is pointed out that exhibits of this type usually cost considerable money and the question is raised whether they are really worth it.

One of the expenses which show exhibitors almost invariably have to face is the cost of repair to machines which have been damaged on the show floor by "manhandling." Although it is agreed that full access to the exhibit on the part of the public has considerable educational value, less than half (14) of the replies favored throwing the exhibits of airplanes open freely to the public. The wear and tear caused by people passing through cabins or sitting in cockpits is very high and the majority of sales managers favor the use of outside platforms for viewing transport cabins, and the barring of everyone from control cockpits except bona fide prospective purchasers. Cases are on record where persons highly interested from a technical or purchasing standpoint, have found it almost impossible to approach an exhibit, or to gain access to salesmen, without unreasonable delay in a long line of the merely curious. It appears to be desirable to limit the access of the general public to exhibits, leaving detailed examination of the equipment to the discretion of the personnel in charge.

Actual flying demonstrations are costly and in the opinion of sixteen of the 31 writers should be strictly limited to real prospects. Ten favor making as many flight demonstrations as possible (some to the extent of making free airplane rides available to the general public), and five would leave the matter in the hands of the exhibit personnel.

Opinion is very strongly in favor of limiting printed advertising matter for general distribution to relatively inexpensive leaflets, holding back the more elaborate and costly illustrated catalogs for real prospects. Twenty-six replies were definitely of this opinion, two favored catalog distribution, regardless of expense, for its educational value, and two favored a restricted distribution of catalogs only.

In the matter of price quotation only one person believed in quoting fly-away prices at the show. The 26 others who replied were definitely in favor of F. A. F. or F.O.B. prices, with complete delivery cost estimates available at the show for any section of the country.

The majority (19) did not believe that it was practical or desirable to guarantee prices for definite periods. Five believed that such guarantees were feasible, especially to dealers and distributors, and three others would leave the matter at the discretion of the manufacturer. Four persons did not express an opinion on this matter.

Few advocate the entire exclusion of children from the show, but it is obvious that they must be kept under control. The majority proposes that children be admitted to the regular show sessions only when accompanied by adults, and that special times be definitely set aside when they may be admitted unaccompanied. At such times the exhibitors should provide whatever additional personnel is deemed necessary for the protection of their exhibits. It was suggested that much could be accomplished in this direction through cooperation with the local school authorities. Very few favored unlimited distribution of elaborate catalogues to children, although a number thought that a controlled circulation of inexpensive literature has positive educational value.

A symposium on the conduct of aeronautical exhibits consisting of the opinions of some thirty leaders in the sales field. The first two pages are devoted to a study of the replies of the group to ten selected questions. On the next ten pages are the responses in detail.

Although the automobile trade offers sufficient precedent for placing the announcement of new airplane models on an annual basis, only four of the 27 who discussed this point concluded that such a procedure would be of benefit to the industry. In the present state of the art, changes and improvements are continual, and the general concensus of opinion was for the announcement of new models and designs when and as they become available.

A PLEA FOR UNIFORMITY

By P. H. Spencer

Amphibions, Inc.

WITH only one national aircraft show coming in April, I believe it would be well for all of the exhibitors to concentrate their efforts to make this year's show one which will appeal as broadly as possible in all lirections—taking in national scope from the publicity point of view as well as dealer, distributor and professional operators.

P. H. Spencer

(2) With the show we would like to see an aspect of harmony in the appearance of personnel. In this direction, it would be well for evening dress to be in force after dinner. The dress at other times should be one of the individual's taste.

(3) Cut-away portions of particularly novel points of construction and any special material which will go to make up a complete exhibit having a broad appeal should be particularly advantageous at a national show. A strictly stock model plane placarded and priced as such would be a great help since most of the exhibitors in the past have made up specially attractive show models which have been somewhat misleading as to values.

(4) The rightfully curious public should be given as much access to the various exhibits as possible and only delicate parts need be protected from handling or fingering. I feel that no exhibitor should permit promiscuous climbing in and out of planes and harmony among all exhibitors in this direction would be of considerable importance. If there isn't harmony, there will be some indignant visitors, made so unnecessarily by not being able to climb into some cabins or cockpits while permitted to do so in others.

(5) Some prospects, individual, dealer or otherwise, will probably be about the flying field a considerable part of the time during the show and will probably scrutinize the wearing qualities of the demonstrating planes. However, it seems hardly necessary or practical that the week of the show be used for such tests of the wearing quality of the planes exhibited. Congestion of the air where there is a congregation of demonstrators has brought about sad results in the past and I am in favor of any means to prevent a repetition.

(6) Those exhibiting planes in the Rolls Royce and Packard class will have catalogs in keeping with their class of product and naturally will be careful about the promiscuous use of their literature, and the flimsy leaflets which represent some of the lower priced products will probably be watched less closely and will get into the hands of literature collectors who are so prevalent at all of the shows. The situation in my opinion rests entirely with the individual exhibitor. However, I am in favor of as broad a distribution as possible.

(7) Since the aircraft manufacturers' responsibility ceases after the planes are test flown at the factory, it would seem logical with the varying insurance rates that for the time at least that exhibitors would quote fly-away factory prices.

(8) Timidity has been prevalent the past year on the part of the purchases and this year as before, it will be up to the successful salesman to break down this attitude and I am sure that each one will use their own methods.

(9) Curious children seem to be one of the necessary evils of all of the aircraft shows and more pestuous than ever when unaccompanied by grown ups. I think one or two afternoons should be given over to children's visiting days and other than that they should be excluded when unaccompanied by grown ups. On children days extra aid can be enlisted.

(10) I see no particular hope of the years 1931 or 1932 bringing about a stabilization of aircraft design to permit bringing out early models. As a matter of fact we were nearer the point of stabilization at the end of 1929 than we are today. 1931 seems to be a year of changing models and the introduction of freak designs.

EMPHASIZE SAFETY AND COMFORT

By William B. Stout

THE appeal should be aimed, I think, at the general public and nation-wide publicity on commercial aircraft, without reference to military activities.

(2) I am quite in favor of evening dress after the dinner hour, on the floor, since the automobile show has set that precedent. It differentiates, immediately, the authority of those on the sales floor from the casual stander-by.

W. B. Stout

(3) Believe the public should be more or less sold on the structure of the plane having an approved type certificate, aside from the question of maintenance in airline or commercially operated planes. As far as the public is concerned, special features of easy flying, safety, comfort, and low cost can well be the things emphasized. Ordinarily cutaway models of the structure only divert attention to detail.

(4) Whether the public has close contact with the exhibit or not, I would think, would depend on the exhibit. At the show, I would be in favor of keeping the planes where they will not be touched, with every opportunity for demonstration and inspection on the field.

(5) Believe demonstrating machines should be kept going, but with particular attention to active prospects.

(6) Catalogue precedent of the automobile shows can hardly be better. Leaflets and sample folders for the general public, where desired, and real catalogues hidden away for actual prospects.

(7) Believe prices should be D.O.F. (delivered our field) at point of manufacture and all planes flown away. Otherwise, crating, etc., extra.

(8) No comment.

(9) School children should not be neglected. They should be given a special day or morning at the show with special admission tickets, given out by the teachers. Otherwise not admitted unless accompanied by parents.

(10) This is a business policy which must be determined by each concern to fit its own problems.

PUT EVERY VISITOR INTO THE AIR

By Earl E. Hughes

Curtiss-Wright Corporation

AS far as we are concerned, the primary appeal of our exhibit is directed to the dealers and distributors and those professionally operating aircraft. Second in line of importance is the general favorable nation-wide publicity which should result from events of this kind. The local public would come last in consideration.

(2) Evening dress, no, but I do think all salesmen and representatives at each exhibit should wear tuxedos. This singles them out to visitors as representatives. We tried having some of our people dressed up in flying clothes, and the effect was not good.

(3) This year we shall show some of the structural details of the Junior model. We want to go a step further and have some sort of an arrangemet that will interest the public to whom every ship is just another airplane. We have been trying to think up some scheme that would put over the idea we developed in our advertising series, "It's Easy to Fly."

(4) We are going to do everything possible to get people in and around the planes, believing that is one of the steps in teaching the public that it's a harmless animal after all.

(5) I do not know of anything that the industry could do in connection with this show that would accrue to our benefit more than getting every visitor to the show in the air. We shall have one of each model and three of the Junior with pilots for demonstration flights. We shall have to give first consideration, of course, to the trade and prospects. We are working on a plan at this time with another concern to give free flights in the Condor and possibly our Patrician.

(6) After seeing our perfectly good and expensive literature disappear in lots of ten thousand and up at these shows, we have decided to have inexpensive leaflets for general distribution, holding our better literature for bona fide prospects.

(7) My personal opinion is that a F.A.F. price is best, as the inquiries will be from people all over the country.

(8) Our stand on this matter is that dealers and sales representatives should have the assurance that prices will be maintained.

(9) We feel that not only students of college and high-school age, but those in the grade schools, should be given every opportunity to familiarize themselves with aviation. With that in mind, we are encouraging one of the model companies and have contributed to a good many model contests. On this subject, we are in favor of having the school children in, but certainly something should be done to regulate them and not allow them to run wild, as they did at the last Detroit Show—where they were accountable for considerable damage in several cases.

(10) Our stand on this matter is evidenced by the showing of our entire line to our dealers at St. Louis. In this way, every dealer has an opportunity to see and fly each one of our line. This gives him first-hand information rather than through hearsay and rumor, as few of them can afford to buy one of each model. In addition, it gives us an opportunity to make corrections and revamp our models and size up our market on each model in advance of the show. We shall go to the show this year, ready to jump into sales, knowing where we stand with our entire line—rather than getting this reaction at the show.

PRICE GUARANTEE IS GOOD BUSINESS

By Eric H. Nelson

Boeing Airplane Company

WITHOUT question, we feel that the special appeal of an aircraft show should be directed at the public at large rather than to any specific group such as the local public, dealers and distributors, or airline operators. This is especially true in connection with national shows receiving nation-wide publicity in which all types and kinds of aircraft manufactured throughout the country are on display.

Erik Nelson

(2) In view of the fact that the aircraft industry as a whole is dealing with a relatively high priced product, we consider the proper procedure that all company representatives should be in evening dress after the dinner hour.

(3) Whether cutaway models, wings with the fabric removed, etc., should be shown, depends entirely on the product which the manufacturer is exhibiting. If it will serve as a sales argument by demonstrating a certain type of construction which is obviously superior to that used in competing planes, we would say that it was worth the manufacturer's time and expense to submit such a model.

(4) The answer to this question depends on the type of equipment on display. If the manufacturer is showing a large cabin transport plane, it is desirable to make use of a wooden structure allowing the public to inspect the cabin arrangement and the pilot's cockpit or even to sit in the seats as it allows the general public a chance to familiarize themselves with the comfort of a transport airplane.

(5) We do not feel that there is any material advantage to be gained by being generous with flying demonstrations during the show, but that it is much more worth while it limit them to bona fide prospects or those already actively engaged in aircraft operation.

(6) The publicity matter distributed at the exhibit should for the major portion consist of simple leaflets or inexpensive printed matter containing a few photographs of the manufacturer's products. Elaborate catalogs or detailed specifications and other important sales promotion literature should, of course, be in the possession of the company representative and available on demand.

(7) It is our feeling that either F.O.B. or F.A.F. factory prices should be given in preference to prices on the equipment delivered in the locality where the show is held. If any other price information is desired by a prospect, this information may be obtained on request from the salesman in attendance at the exhibit.

(8) We most certainly feel that when new models or new prices are announced at a show it is advisable as well as being good business to guarantee maintenance of price for at least six months.

(9) The attitude of this company toward school children is that they be kept at arm's length at all times and very little attention paid to them unless they are in company with parents or some responsible older person.

(10) In view of the fact that a great deal is being demanded of the airplane industry, it is our feeling that it would be unwise not to bring out new models or improvements at irregular intervals or whenever such items are available for incorporation in production models.

SCHOOL CO-OPRATION FOR CHILDREN

By W. B. Hulburt

Bellanca Aircraft Corporation

THE appeal that we will endeavor to make at the National Aircraft Show this year will be to secure general favorable nation-wide publicity.

We are very much concerned also with the problems of our dealers and distributors, and it will be our purpose to give these gentlemen special attention.

We are meeting our people at the show on a business-like basis and we are more particular about the manner which our salesmen handle these people than the fact that they are dressed in evening clothes with an air of superiority which would not be at all in keeping with the work to be accomplished. The men on duty at our exhibit will be asked to wear business suits and naturally, to present an immaculate personal appearance.

We are of the opinion that the public has not as yet become sufficiently acquainted with the various details of an airplane that would warrant a great deal of time and effort being spent on cutaways, cross sections, etc., and while we expect to show photographs of the various component parts of our ship, we are concentrating the greater portion of our attention on the ship as a whole.

We are arranging our exhibit so that it will be convenient for people attending the show to see every portion of the ship. Every precaution will be taken to prevent anyone becoming injured.

Special literature for the show should be prepared with a view to giving as much general information as possible, leaving standard leaflets and catalogs available only to those whom we consider to be definite prospects. More elaborate literature and information will be obtainable at our hotel rooms or by means of signed cards requesting further information.

While we will have an extra ship at the show on the line with a pilot, we do not expect to do promiscuous hopping and such flights that will be made will be controlled entirely by the discretion of the sales executive in charge.

The prices of our ships will be quoted at the show all on a basis of fly-away field New Castle, Del. There will be no guarantee of price maintenance simply because we feel that this is impossible on account of the changes in prices of commodities and further, that our company has always stood for a policy which would not permit promiscuous discounts on price cutting. It is only upon the integrity and the reliability of the organization in the customer's mind that will make him feel certain that he will be given every protection within our power to substantially continue our prices, making only such changes as the fluctuation in commodities necessitates.

The admission of the children to the show of course is a problem which should be given thorough consideration by the show managers. It is our honest opinion that the promiscuous invasion of the show of great numbers of children who have not been carefully picked would result in damages to the exhibits and an undue waste of literature. The schools of Detroit certainly could co-operate greatly in the admission of children at certain specific hours, on certain set days, giving preference to those who have displayed keen interest in aviation. If they were to attend the show under the guidance of their teachers, we feel that a great deal could be accomplished in helping them to understand the details of a business in which they have shown the most extraordinary enthusiasm.

The Bellanca Aircraft Corporation has never brought out annual models, nor have we held off improvements in our ships for specific dates such as the annual show period. We are definitely committed to a policy of consistent improvements in our product and we already have the confidence of our owners with regard to this policy.

WELCOME THE SCHOOL CHILDREN

By Victor H. Roos

Lincoln Aircraft Company

WHEREAS there seems to be no individual class of buyers that is netting the industry any abundance of sales, it appears logical to appeal to any and all classes, including the local public, dealers and distributors, aircraft operators, and the public at large.

V. H. Roos

A dignified, business-like atmosphere and appearance of an aircraft show should impress the visiting public that the industry has arrived at the economic and practical stage of our daily routine. Evening dress or flying togs have a tendency to deflect from this impression.

The public as a whole is not familiar with the construction of aircraft, and showing cutaway models or uncovered wings, etc., should be interesting and educational. The public is eager for any information,

therefore exhibits should be accessible as possible, and the easier it is for visitors to inspect them, the better.

The more flying demonstrations given to the non-flying public, the quicker will they become accustomed to flying and consequently the greater the sales.

Because of uncontrollable waste created by elaborate catalogues, it seems that a policy of inexpensive circulars, which can be more judiciously given out, would be the more acceptable.

The only way a manufacturer can advertise his price is delivery at the factory. It remains for the local dealers to quote prices delivered to the purchaser in his immediate locality. Guaranteeing a prospective purchaser against a decline in price for say three or four months is entirely consistent and should encourage sales. There are few ideas that can enter the mind of a prospective purchaser that will postpone buying as quickly as the thought of a possible reduction in price, after he has made his purchase. It has been the writer's observation on more than one occasion where the thought of prospective reduction in prices greatly curtails airplane sales.

School children should be welcome at our exhibits, but if it is possible, discretion should be used in permitting them to climb on the plane, as well as regards the quantity of literature which is given to them.

It is impractical for all airplane manufacturers to announce new models at one time during the year, and for several reasons is it better to announce models and improvements as quickly as completed by the manufacturer.

CONTACT DEALERS AND DISTRIBUTORS

By W. B. Mayo

Ford Motor Company

THE greatest attendance at a show will be, I believe, from the locality in which it is given. The greatest aim, in my opinion, should be to properly contact dealers and distributors, and such potential retail buyers as might attend the show. It also gives the manufacturer a fine opportunity to show his equipment to pilots and those vitally interested. While only a few shows are now given, we should secure all the nation-wide publicity possible.

W. B. Mayo

(2) I believe that it is best to have all salesmen in evening dress in the evening. I think it adds some character to the exhibit and is a favorable contrast from the flying field clothes that might be worn during the day.

(3) While it is perhaps not vitally necessary to acquaint visitors with the details of structure, as time goes on it will become more necessary.

(4) I think it is desirable to let the public come in close contact with the exhibit. We have, however, found it advisable to rope off our exhibit—or at least a part of it—to control those who get up close; otherwise it is impossible to pick out and handle prospective customers.

(5) We are of the opinion that demonstrations should be limited to prospective purchasers and other prominent people.

(6) Advertising matter, I believe, should be confined to rather simple booklets, and fine catalogs which should be kept under cover and held for prospective customers only.

(7) We are of the opinion that all prices should be given on the basis of delivery at field and factory.

(8) We feel that the industry is not yet old enough to adopt any set policy in regard to new models or prices.

(9) School children, we believe should be admitted to the show at half price and given as much opportunity as possible to feel the planes over. They should also be given a reasonable quantity of printed matter, as they are our prospective future customers.

(10) We are opposed to the policy of bringing out annual models as we think it helps make the business more seasonable than it would naturally otherwise be.

LET THE PUBLIC "MANHANDLE" PLANES

By Willfred G. Moore

Inland Aviation Company

IF THERE is to be only one national aircraft show, annually, special appeal should be made to dealers and distributors, as it is from them that the aircraft industry can look for immediate results in the way of sales. Other features of the show, such as interesting the local public and securing nation-wide publicity, should be considered merely as by-products of the main purpose.

(2) Every good salesman appreciates the value of correct appearances. It appears to me that the atmosphere of the aircraft show should be placed on the level of a high social standard, commensurate with the prices usually asked for the aircraft shown.

(3) Concentrate the attention of visitors to the complete airplane. The average purchaser of aircraft is not greatly concerned with structure details so long as the airplane has been granted on Approved Type Certificate.

(4) Let the public "manhandle" the airplane as much as they want to. If the "hands off" sign is hung on all airplanes in a show the natural psychological reaction to the public is that the airplane is still a fragile contrivance which must be handled very carefully.

(5) Give flying demonstrations only to those who you feel are sincerely interested in your airplane.

(6) Elaborate catalogs are expensive. A simple folder is usually most satisfactory to the average visitor at an aircraft show. Save your catalogs for the man who is in the market for an airplane.

(7) I believe it has been demonstrated that it is good merchandising to quote your price, F.O.B. the factory regardless of where the show is held.

(8) Stabilization of price is an extremely important factor in sales. In fact, it is vital. At the present time there appears to be no stabilization of price in our business at all.

(9) At the present time children are our greatest flying enthusiasts and the coming generation is being brought up to regard flying in a most matter-of-fact way. By all means, allow the children a free hand so long as they don't wreck your airplane or exhibit.

(10) The bringing out of new models around show time causes a serious slump in sales for a period of at least three or four months previous to the show and makes the business seasonal. The automobile industry has discovered this and is rapidly getting away from it. That should be proof enough of the unwisdom of this policy.

EXHIBIT AT SOURCE OF RETAIL MARKET

By F. W. Neilson

Sikorsky Aviation Corporation

IF the interested manufacturers are to participate in one major show each year, it is logical to plan the holding of the exhibition in a locality where the surrounding public furnishes the real market in the retail buyer class. This also holds true with regard to dealers and distributors, for it is by these agencies that the majority of retail buyers appear to be served. It is, of course, desirable that an aircraft show secure nation-wide publicity. I do not believe, however, that this is feasible unless the show go hand in hand with a spectacular air meet where the performance characteristics of the various models exhibited are thrown clearly before the public eye. Even in this case, there is the danger that certain manufacturers will be placed at a disadvantage in view of the fact that there are products which might lose out in active competition. To my way of thinking, the sum and substance of the matter is that the show affords for the manufacturer of a certain type and priced aircraft the opportunity to get together with dealers and distributors. To the manufacturer of another type of aircraft there is given the chance to demonstrate to professional operators the relative value of his planes. I do not think that, except locally, the general national public is extremely interested.

F. W. Neilson

(2) The atmosphere of the exhibition should be strictly one of business and immobile demonstration of wares, with perhaps a slight tinge of the flying field for the purpose of interest to the general public. Outside of the exhibition halls, there should be located a flying field, both for the use of the professionals in the aeronautical industry and to create a popular appeal. The question as to whether or not evening dress should be worn by the salesmen is, I believe, a matter for their own company to decide. We would require, unless special circumstances made it not practical, that our particular salesmen on duty be dressed in dinner clothes in the evening.

(3) From the point of view of a company who is and has been producing a

standard form of construction, I do not believe that structural details and cutaway exhibits are desirable. Matters of this sort can be contained in photographs to be explained by the sales force. Large sections of internal structure or uncovered wings take up space and are not particularly interesting, except to experts in the matter of design. There is, of course, the question of demonstrating ease of maintenance by exposing internal sections. As far as strength is concerned, it is generally understood that if a ship is given an Approved Type Certificate, it can perform its guarantees.

(4) The complete exhibit should contain objects which can be handled and those which cannot. It is very interesting to have certain typical small accessories and assemblies peculiar to the manufacturer, which the lookers-on can either operate themselves or see operated at close hand. The complete plane assemblies should not be handled or entered by those who are not immediate prospects. Facilities should be arranged by means of steps and platforms so that all parts of the plane can be viewed by the public at large.

(5) The question of demonstrations is entirely one for the manufacturer to decide. If the plane is of low initial cost and low in maintenance and operating costs, then the manufacturer can well afford to be liberal with his demonstrations. If the operating costs are high, I see no reason why demonstrations should be given to those who do not show an active interest in purchasing.

(6) It is believed that there should be a free distribution of adequate and attractive catalogs. These will find their way into many places and will not only do good to the individual manufacturer, but will advertise the industry as a whole.

(7) With regard to prices, it seems to me that this is regulated more or less by the proximity of dealers or distributors. We quote and shall quote fly-away factory prices, except for export purposes. If a particular exhibit is sold on the spot, it should be quoted at a fly-away factory price. I think the wise course is to exhibit a ship that has already been sold and on which delivery will be made at the end of the show.

(8) Except on models which are put out in quantity production, the question of price maintenance remains a subject of speculative import. I do not feel qualified to give any further opinion than that it is the duty of the manufacturer of a high priced product to keep faith with his customers.

(9) School children should be welcomed to the extent of giving them general education consistent with the status of their mental development. There is no reason why they should mess up an exhibit to the annoyance of both the exhibitor and adults who desire more comprehensive information.

(10) The question of holding a certain model until show time is one which would be very hard to regulate. The development of aircraft has not yet reached such a standard that it is not dependent on the lessons of day to day experience under varying conditions of topography and climate. If it were possible to incorporate in production a certain modification for the benefit of security and efficiency, it would not be to the manufacturers best interests to withhold such changes for a period covering the greater part of the year. This is a disadvantage, perhaps, to the manufacturer in that previous customers are justified in demanding that the model which they hold be modified in accordance with latest practice. Such an eventuality can if tactfully handled be taken care of with mutual satisfaction to both parties.

It might be of interest to again communicate with the manufacturers immediately after the show, as of course, at that time their experiences will be live and their opinions more concrete and decisive.

DIRECT ATTENTION TO UNIT AS A WHOLE

By R. W. Fulton
Fleet Aircraft, Inc.

QUESTION 1 depends entirely upon the type of aircraft manufactured and on exhibition: (a) Transport units should be aimed at public carriers and commercial organizations which could use such units in their business. (b) Smaller ships should be directed at dealers and dealer prospects. (c) General publicity obtained for both.

R. W. Fulton

(2) The atmosphere at the show should reflect neither the drawing room nor the flying field. Our best efforts should be concentrated upon creating the atmosphere of general average, thereby indicating the broadest possible application of the industry to the public. The dashing cowboy outfit previously used by some representatives in the industry has lost its glamour, but we do not believe the industry has yet arrived at the stage of sophistication generally typified by exhibitors' representatives in evening dress.

(3) Attention should be directed to the unit as a whole. Structural details and cutaway models mean little to any but those particularly interested and they will always require information and data which cannot be conveniently exhibited.

(4) Special show models incorporating expensive finish and interior details can best be shown without permitting general public to climb in and out.

(5) New models should be generously flown on demonstration but known types or models should only be flown when essential for purpose of definite sale.

(6) Simple leaflets most effective for general distribution. Expensive catalogs obviated by presence of actual model which should be more impressive than any printed word. Most interested prospects generally do not require catalogs.

(7) Manufacturers' prices should apply to factory delivery as most purchasers and dealers of aircraft still insist on inspecting and flying individual ships purchased. A limited distribution to any one area obviates chance of local delivery quotation.

(8) Arrangement of price protection to dealers is desirable, but individual purchasers should be sold on value at the time of purchase. Good business judgment will eliminate radical price change, which would seriously affect dealer organizations.

(9) School children should be admitted, but at special hours and under control. Simple pamphlets should be used for distribution.

(10) Detailed changes should be announced as developed, irrespective of date, but new models will naturally appear first at the aircraft show, due ti only on show per year and presence of general public and dealers, thereby affording more general publicity.

SCHOOL CHILDREN NOT TO BE ENCOURAGED

[A prominent figure in the industry who has been very actively concerned in the preparation of important exhibits at a number of national aircraft shows, but who has special and individual reason, the validity of which we recognize, for not wishing his name made public in connection with the summary of his opinions which follow.]

A NATIONAL show such as that which is to be held at Detroit must serve several purposes. As a matter of economics, it must first be staged to attract a gate locally. Second, its major use is to secure valuable nation-wide publicity. Third, it should attract for comparison of models, those operating and selling aircraft professionally in the several phases of the industry and finally, it can add to its value by attracting retail buyers who will help dealers and distributors to get a start on their business.

(2) The atmosphere should be neither that of the flying field nor of the drawing room. It should be the atmosphere of any healthy business. I believe the use of dinner coats for the evening is not a bad idea, but owing to the remoteness of most of the shows from the places where the stand attendants can live, this works a hardship. My suggestion would be that those on the stands be requested to use dark business suits afternoon and evening and that the use of the various flying costumes be discouraged .

(3) The question of what should be shown is a question tied up with the type of visitor who is being talked to. Also, there is not much use in showing cutaway sections of well-known standard types of structure. There is definite advantage in showing details of new types of structure design.

(4) It depends on the visiting public as to how much they should be allowed to get close to the plane. Certainly, during the periods when school boys are allowed and encouraged in the show, a respectful distance should be maintained by all. During any special sessions when the general public is either not invited or encouraged, there should be no restrictions, within reason.

(5) Flying demonstrations should be limited to those who really want them for a business purpose. Incidentally, such demonstrations, when the field is contiguous to the show, detract from the show.

(6) Reasonably complete catalogs should be available for those whose identity is known and whose interest is real. The remainder of the publicity should be in simple leaflets.

(7) I don't know enough about the retail selling of airplanes to make any comment on how prices should be set up. As an individual, I am always annoyed by F.O.B. prices on an automobile.

(8) In regard to price cutting, if the automobile business has not been able to do it and is still talking about it, I doubt if anything can be done in the airplane business.

(9) I do not believe that school children should be encouraged. By the time they

have become even prospective purchasers, the picture will have changed so completely that their education at a show is a very minor matter.

(10) The automobile industry has broken away in the past few years from the annual model just before the show idea. I do not think this is a thing which can be decided upon, as someone is almost sure to break away. The weak link in any agreement of this sort is the manufacturer who will not play, and there is usually one of such a type of sufficient strength to make the efforts of the rest of the industry abortive in this particular direction.

MORE FREE RIDES FOR THE PUBLIC

By Robert Porter

Kinner Airplane & Motor Corporation

FUTURE growth of aviation in America is contingent upon broad acceptance by the American public of the airplane as a mode of travel, whether for business or pleasure, and one medium for bringing home to the people the advantages of this comfortable and rapid form of transportation is the National Aircraft Show. Not all of the show visitors, of course, are prospective purchasers of airplanes, but they are all prospective patrons of air lines. As such their interest should be developed and encouraged.

Cutaway exhibits of engines and airplane parts, showing constructional features, should be a part of the show, the aim being to furnish those interested a more intimate picture of the constructive side of the industry. Access to all exhibits should be accorded everyone.

The possibilities of demonstration flights as a means of educating the public aerially are huge. I believe that if these flights were free, the privilege would not be abused to any great degree, but I do believe that a great amount of good would be done if the bars on these flights are let down to some extent.

Every consideration possible, consistent with other work during the show, should be shown children who visit the exhibit, for they are the future pilots, designers and patrons of aviation.

Last, but not least, in carrying out this public educational program, all of the valuable material made available at the show should be disseminated to the press of the nation. Editors have always given generously of space for news pertaining to the industry and the wealth of information developed at the show should be made available for their use.

EVENING DRESS DEMORALIZING

By Karl S. Betts

Detroit Aircraft Corporation

IN MY opinion the special appeal of an aircraft show should be directed to securing a general, favorable, nation-wide publicity and attention. I do not favor exhibiting at more than one aircraft show during the year, as the results in actual sales have never equalled a fraction of the expenses involved.

(2) I prefer to see a business setting for the show and certainly do not favor dressing up our salesmen in evening clothes. I think that the effect of any such plan would be positively demoralizing on most of our salesmen pilots.

(3) I believe that cutaway models, etc., have a definite sales appeal at the present time. Structural details as suggested by you offer a real sales argument for the manufacturer.

(4) In allowing the public to handle and climb over our exhibits, we are confronted with a distressing necessity. Such a procedure must be followed, regardless of the manufacturer's discomfort, if we are to continue to sell the general public on aviation. Keeping the public at a respectable distance is a very bad merchandising policy, regardless of any other consequences.

(5) I rather lean toward a generous policy in demonstrations but limited strictly to adults who can be considered prospects now or at a future date.

(6) Unlimited distribution of catalogs at an exhibit booth is a tremendous waste. We have only simple inexpensive leaflets for distribution, and our catalogs are limited to our prospects and clients.

(7) I very much favor price quotations, flyaway factory, as any other quotation is subject to the widest possible variation.

(8) I can see no advantage either to the manufacturer or to the customer in giving price guarantees for a specified period of time. I believe that customers should always be notified of improvements in design and in a great many cases minor changes will improve old models so that their performance equals that of the latest type offered to the public.

(9) I certainly oppose giving unlimited amounts of printed matter to children purely from a budget standpoint.

(10) I very much favor the announcement of new models at irregular intervals as I believe that this is one means of keeping both the public and the aircraft manufacturer keyed up to a higher degree of interest and enthusiasm.

DIGNIFIED AND BUSINESS-LIKE

By R. S. Saltus, Jr.

The Ludington Corporation

I THINK the show should appeal primarily to those people who are in a position to buy the types of aircraft there shown, whether they be power gliders or large amphibions, and that the company that best attracts the possible purchaser will by so doing attract the dealers and distributors which he would like to have.

As to the general appearance of the show, I feel that it should be reasonably dignified and business-like.

Referring to cutaway models, etc., my own reaction is that it would be better to simply have certain sections cut away to show the strength and construction of a particular detail, rather than have the entire covering removed from the plane. People who do not understand aeronautical design often get the impression, mistakenly, of a lack of strength.

I think the public should be allowed to get as near an exhibit as possible, but should only be allowed to enter such planes as the large transport planes, where they cannot do any particular harm. Platforms with railings, enabling the customer to see the inside of the cockpits, etc., are very helpful, and keep the customer from handling the plane, leaning against the wings, etc., but still give him a chance to see what he wants.

Certainly the manufacturer will have to give his good prospects demonstrations, but weeding the good from the bad is up to an alert sales manager.

I think that simple leaflets are just as satisfactory as the more expensive catalogues for the normal run of cheap planes. The greater your sales price, the greater care must be taken with your advertising and publicity.

I think the F.O.B. or F.A.F. prices should be quoted, but if the manufacturer is alert he will know what his delivery charges are to any part of the country.

Guaranteeing maintenance of a price for six months certainly would be a nice thing to do, but I doubt if many manufacturers would feel that they are in a position to do this at the present time and stick to it, when conditions may change as rapidly as they are now doing in this industry.

BE GENEROUS WITH DEMONSTRATIONS

By George A. Wies

George A. Wies, Inc.

WE DO not believe the business has reached great enough proportions to justify directing the show at any particular market. The one show might be aimed at all markets, namely, the retail buyers, distributors and dealers, and those professionally operating aircraft. The manufacturers would develop valuable dealer and distributor contacts and should make every effort to do so, but the show should not be confined to this one purpose, but rather to the promotion of aircraft and sales relations between the manufacturers and distributors, and dealers in general.

(2) We believe that there should be harmony in the general appearance and manner of a show. It would be a very good idea to have all salesmen in evening dress after the dinner hour. It is our belief that everything possible should be done to convey to the public the idea that flying is for everyone, and not for a chosen few, who must appear equipped similar to a deep-sea diver and possess special qualifications that few can hope to possess.

(3) We do not believe that any harm could come of exhibiting cutaway models, etc., in addition to completed machines, especially if the cutaway model is an example of fine design and workmanship, and is explained to those interested in a simple and pleasant manner. Every attempt should be made to convey the idea that the airplane is not a very unusual and complicated piece of machinery.

(4) The visiting public should be allowed to have as much of a free hand in fingering and climbing upon the exhibits of the aircraft show as they have at the auto or motor boat show.

(5) It is our belief that we should be generous with flying demonstrations. You never know when the fellow just taking a ride is going to feel the urge to own a machine of his own. In this connection, let us try to make these real demonstrations, and try to convince the prospect that flying is safe and comfortable.

(6) We suggest that leaflets be given out freely and the elaborate catalogs be given to those seriously interested, or to those in a position to buy.

(7) We believe F.A.F. prices to be the most satisfactory. Some customers wish the ships flown in by a pilot employed by the distributor, some want insurance for the ferry trip, and others do not, all making a difference in the delivered price. We find the F.A.F. prices suit everyone the best, and are easiest to work with.

(8) We do not see how prices can be guaranteed at the present time, and doubt very much the advisability in guaranteeing them if it were possible to do so.

(9) We believe everything possible should be done for the school children. After all, they are going to be the people who will be buying airplanes some day, and it is our job now to help and cultivate them all we can.

(10) We do not believe it advisable at all to attempt to bring out a new model at every show. Our most successful manufacturers have brought out but a few good designs, and have improved and developed these designs over a period of years.

SEPARATE SHOWS FOR EQUIPMENT

By Robert E. Lees

Kellett Aircraft Corporation

IF THE special appeal of the aircraft show is aimed at the local public as potential retail buyers it should at the same time be attractive and equally valuable in its results upon dealers and distributors visiting it and who are equally interested in retail sales. The line between the selling of aircraft at retail and the commercial operating of it is becoming more clearly marked each year, and I think eventually we will have equipment shows of interest to the transport operators, and retail shows of interest to the dealers and the public.

R. E. Lees

(2) There should be as much harmony in the general appearance of the exhibits of the show as possible and I feel that the public should be made to feel as much at home as possible. The flying field atmosphere is often the atmosphere of stunt flying, stunt people, so that the exhibitor here will have to determine for himself what he feels will be of most interest to his customer.

(3) I do not believe it is desirable to call the attention of visitors to the structural details of aircraft, for I think it can be generally agreed that the outside appearance of any aircraft indicates more structural ruggedness than the interior of it does. I think in general that the public is often surprised at the frailty of the interior structure when it is revealed and I therefore think that such exhibits are often detrimental.

(4) This is something to be left to the discretion of the salesman. You have often noticed how earnestly the automobile salesman will see that you get into that new car of his for after you have sat in it and played with the controls you may realize how old and shabby your own car has gotten in the meantime.

(5) Flying demonstrations likewise must be gauged by the degree of interest and possibility of making the sales. It must not be overlooked that at the present time there are quite a few people who are willing to add to their flying time at your expense.

(6) Simple leaflets giving the essential information seem to me to be sufficient to hand out at the aircraft show and when prospects show interest the promise of mailing an elaborate catalog is one way of getting names and addresses.

(7) Prices at present are painful enough so let's quote them at the factory.

(8) Guarantees or discussion of price maintenance guarantees often emphasize the instability of the market so that it would seem best to quote present prices and avoid as far as possible discussion of price maintenance.

(9) It seems to me to be very important that the school children be given an opportunity to see the aircraft show, but a special time should be set aside for this and they be admitted without guardians only on such a special day.

(10) It seems the American buying public likes to think of annual models and only time will prove how much we can stabilize things in this direction.

AIR TERMINAL, NOT DRAWING ROOM

By E. V. Rickenbacker

Fokker Aircraft Corporation

ONE national aircraft show to be participated in by all manufacturers, centrally located, is in keeping with the economics of the industry in the writer's estimation. It should have local public appeal for its financial success. Its products should appeal to both dealers and distributors as well as transport operators. Favorable national and international publicity should be commanded.

(2) It is not the writer's opinion that salesmen or executives should be in dinner dress after the dinner hour, as the atmosphere of such an exhibition should include the atmosphere of a large terminal and not the drawing room.

(3) Prospective customers and the public as a whole should be inspired with the structural simplicity and airworthiness through exhibition of cutaway models and exposed designs.

(4) For educational purposes it is advisable that the public be given every opportunity of becoming familiar with the interior and exterior of all types.

(5) Cost of demonstrations and depreciation of flying equipment demands judgment being exercised as to the value of prospects worthy of being given a ride.

(6) Elaborate catalogs or simple booklets should be distributed freely, depending upon the cost and judgment of exhibitors.

(7) Planes should be priced on the basis of F.A.F. where plant is located.

(8) It is difficult to guarantee prices at any time without serious consequences and should be left entirely in the hands of individual manufacturers.

(9) As many school children as possible should be invited with opportunity to see all there is to be seen and given as much cheap printed matter as the manufacturer deems he can afford.

(10) The proper time to bring out new models depends entirely upon the condition of the individual manufacturer's business and should not be regulated by confining it to any definite date, annually or semi-annually.

ARGUMENTS ARE SPEED AND SAFETY

By Walter H. Beech

Curtiss-Wright Airplane Company

THE appeal should be directed to every line and walk of life, as airplanes can be made to fill almost the same possibilities in commercial activity as the automobile.

Walter Beech

(2) The harmony and general appearance of the show should be dignified, but I would say not more than good appearance and general dress would warrant.

(3) We do not believe structural details should be shown very much, and all sales arguments directed at speed, pleasure, and safety.

(4) I believe that the public should examine the machines as much as it desires, but not to the extent of tearing them apart.

(5) It is very necessary to have demonstrating machines on the grounds at the show.

(6) Catalogues or leaflets should be furnished.

(7) Prices at factory only could be quoted satisfactorily.

(8) A guarantee that no price reduction will be made is advisable.

(9) School children should by all means be shown planes and given literature that they can read and understand.

(10) New models and features should be announced as often and fast as possible.

EVENING DRESS ESSENTIAL

By Carl B. Squier

Lockheed Aircraft Corporation

I BELIEVE our efforts should be directed not only to those operating aircraft professionally but to a general favorable nation-wide endeavor.

(2) There certainly should be a general mode of appearance and decorative features for an aeronautical show. I believe evening dress for salesmen on the floor after dinner hours is essential. I firmly believe the more we can convince the public that aviation is out of the grease monkey, helmet and goggle wearing class, the sooner the industry will be entrenched as "big business" and fulfill a dignified, definite niche in the field of transportation.

(3) I believe this should be left entirely to the discretion of the exhibitor.

(4) The cost of refinishing an airplane

costing $25,000 after "manhandling" is enormous, and I do not feel the general public should have continuous entrance and exit through a cabin plane, nor should it be placed upon a pedestal where all those who can may see and then wander away with unsatisfied curiosity. An eager, industrious, trained salesman can invariably segregate prospects after a few words of conversation from the curious.

(5) This should be left to the discretion of the individual manufacturer; however, I believe that well directed demonstrations are the greatest builders of goodwill and one of the strongest sale assets.

(6) Elaborate catalogs are too costly to be freely distributed, but believe publicizing matter should be confined to simple leaflets, with a goodly supply of catalogs for proper placing in the hands of qualified prospects.

(7) The prices should be F.A.F. with a definite amount set for each zone in the United States, covering all delivery charges.

(8) If a retail price is fairly set on a commodity at the time of its introduction, I see no adequate reason for guaranteeing against price cut for any extended period. The purchaser can be convinced that he receives his money's worth.

(9) School children are future aircraft purchasers, and should be freely admitted during the exhibit at definitely stated hours.

(10) I believe improvement and advancements in models should be made continuously. Where radically different models are conceived and proven practical, however, I believe it is worthy of a bang-up trade announcement with a large enough advertising budget to popularize its introduction.

GIVE CATALOGS TO CHILDREN

By B. Russell Shaw

B. Russell Shaw Company

I BELIEVE that a general show policy should and will for some time to come, be directed at securing a general, favorable, nation-wide publicity, creating interest in the minds of the layman in airplane construction and the possibilities of its varied and wide uses.

B. Russell Shaw

We have always felt, with regard to dress at the shows, that aviation should be placed on as high a plane as possible and I believe one of the best ways of creating this favorable impression in the minds of the buying public is to request all salesmen and exhibitors to be in evening dress after the dinner hour. The atmosphere of the exhibition should not be that of the flying field, but should be one of dignity and conducted in a manner so as to impress the public with the substantial standing of aviation as a part of the automotive industry.

As for calling the attention of visitors to structural details in aircraft, it is my opinion that the general public is not particularly interested in construction details, but are more likely to be impressed with the machine as a completed transportation vehicle.

With reference to allowing the public to handle the planes promiscuously, I believe that all exhibits should be fenced off, so that those who are not particularly interested in the craft may pass along outside of the confines of each individual exhibit, but others should be invited to inspect the planes at their leisure.

In the matter of general flying demonstration during the show, I think this should be confined to prospective purchasers or those expressing particular interest in a certain model, rather than to throw it open to the general public to take a free ride particularly when abuse is made of this privilege by those who never will own an airplane from financial reasons or otherwise.

In the matter of elaborate catalogs, I think no set rule can be established and the collecting of these catalogs by children, in my mind, should not be discouraged, because they read them very carefully and absorb every ounce of information contained in them. As to whether these catalogs should be of the more expensive variety, will depend a great deal upon the exhibitors and how much they wish to charge off for advertising but they must be attractive as they are to create interest. The more elaborate and expensive catalogs could be distributed with more discrimination.

The old story of the cost of an automobile enters into the price quoted on aircraft and as to whether these prices should be factory prices or delivered prices is a matter upon which I do not feel qualified to pass, but I do believe that for matters of national publicity, it is necessary to have an established price, whether it be an automobile, airplane or any other vehicle. It may then be up to the local distributors to set their own prices delivered and to make their conditions accordingly.

The public is accustomed to price changes in automobiles and I do not believe that there should be open discussion as to possible reduction in price. Neither from the standpoint of good business can I see where prices could be guaranteed for a period of say, six months.

In the matter of welcoming a great number of school children into the exhibits and the distribution of printed matter to them in unlimited quantities, I am of the firm opinion that we should encourage the school children and the younger generation to understand and appreciate transportation.

With reference to bringing out new models and keeping them secret, naturally from the matter of showmanship, there will never be a publicity department of an aircraft show that does not jump up and crack their heels together when they can announce a mystery ship and undoubtedly there will always be manufacturers anxious to gather in this type of publicity. On the other hand in this day and age of keen competition and our rapidly changing ideas in refinment of detail, I believe the aeronautical industry will find itself in much the same position as the automobile industry by keeping their models up to the minute and with the exception of fundamental designs and changes in construction which are not economically sound from the standpoint of frequent changes of dies, jigs and fixtures, airplane models will change in refinment of detail, in improvements, fittings, instruments, controls, landing gear, etc., from time to time as these improvements are proven and can be adopted, rather than to wait for a year and allow them to be adopted by the competitor.

INTELLIGENCE RATHER THAN DRESS

By James B. Taylor, Jr.

Lately of Air Associates, Inc.

IN ANSWER to question 1, I certainly think that the most important special appeal of a show should be always nation-wide publicity, for after all it is pretty definite that the general public is not buying airplanes.

(2) I do not think that it makes much difference how the salesmen are dressed. The chief difficulty I have found with past shows is trying to find any salesmen. They are usually over at some other booth or else some one who is told to stay at the booth knows nothing about the particular ship he is selling. I am sure that if a well informed salesman was at the booth at all times it would be a great help.

(3) I think it is decidedly desirable to call the attention of visitors to the structural details of an aircraft. While it is true that it will be over the heads of a great many people, it will on the other hand, do a great deal of educational work and should be worth while.

(4) I think it is quite necessary that the visiting public be allowed to climb around the exhibit. I know it is very difficult to keep them from walking places they should not and it might be advisable to have a certain amount of fencing and only allow a few people at a time to go through. In some of the larger machines the method used at the motor boat show of having a walkway by the machine so that visitors could look in the windows would probably be sufficient. Then any special customers who really seem worth while could be let in the machine. This, of course, to be up to the salesman in charge of the booth.

(5) I think it is absolutely necessary to be very generous with flying demonstrations, again bearing in mind that so far the shows are largely educational and in many cases I have heard unfavorable comments of airplanes that were not demonstrated freely, usually to the effect that there was something wrong with the airplane and they were afraid to demonstrate it.

(6) There is no reason why elaborate catalogs should be distributed but I do think there should be leaflets available.

(7) Prices should be F.A.F. This will eliminate any mixup with regards to prices and the dealer and distributor can then add on whatever is necessary to ferry the machine to the customer.

(8) It would be very nice to guarantee a price for six months but I do not see just how it could be done.

(9) Again bearing in mind that the show is largely educational I think all that could possibly be done should be done toward showing school children over the airplanes. It might be a good idea to set aside a special hour for them and some extra help could be available at the booths to see that they do no damage.

(10) With regards to bringing out annual models, it seems that the time of a show at present, at least, is the correct time to bring them out, although unfortunately the aircraft industry always seems to be a little behind itself and new models are never ready on time. I do not think

that any set rule should be made in regard to this and it should be left to the discretion of the manufacturer when to bring out a new model.

BUSINESS SUITS, BUSINESS ATMOSPHERE

By L. V. Kerber

Spartan Aircraft Company

IN order of importance: (a) Securing a general nation-wide publicity. (b) Those already operating professionally. (c) Dealers and distributors. (d) Local public.

L. V. Kerber

(2) Business suits, business atmosphere.

(3) Structural details should be there to show those who understand such things, but it should not be crammed down the throat of everyone who stops at the exhibit.

(4) The attendant must diplomatically strike a happy mean.

(5) The salesman's perspicacity must come into play here. No chance of offending a possible but improbable purchaser should be taken.

(6) Leaflets on tables, expensive catalogues hidden from sight and given only to the serious questioners.

(7) F.A.F. prices, but be prepared to give delivery cost estimates.

(8) Only if *all* manufacturers make such a guarantee.

(9) See answer to number four.

(10) There can be no fixed rule.

CUTAWAY MODELS DISTINCTLY GOOD

By T. P. Wright

Curtiss Aeroplane and Motor Company

I AM very pleased to furnish the following comments on the specific items which you bring up which will represent my personal views, together with those of several of our engineers here, although they have not been co-ordinated with other officials of the company or with officials of the Curtiss-Wright group in general.

(1) The special appeal of an aircraft show should be directed to the education of the visiting public. If the educational side of the show is emphasized and carried out I believe that the requirements of the buyer, the dealer or distributor will be adequately taken care of.

(2) I believe there should be distinct harmony in the appearance and general makeup of the show. I also feel that the atmosphere of the show should decidedly not be that of the flying field. I favor having the show attendants in evening dress, giving an impression of responsibility on the part of the industry and a general higher tone to the affairs of the industry than have previously maintained. Of course, this does not mean that attendants are in any way to "high-hat" the public as the spirit of courteously disseminating information and answering all questions must maintain.

(3) I am inclined to believe that the idea of showing cutaway models and emphasizing structure is distinctly good as it seems to me it is educational in character and will tend to banish the mystery from aeronautical products and acquaint the public with the basic soundness of structure which does exist.

(4) The visitors should be given a quite free range in inspecting the exhibits. We should attempt to eradicate the impression that airplanes are of necessity fragile and, therefore, should allow close inspection and tryout of controls within reason. I think the further we can go in this regard, the better.

(5) Of course, demonstrators for real prospects should be available and used. However, this is an individual company matter rather than a matter of policy for the show as a whole.

(6) It seems to me that exhibitors should have two classes of descriptive information, one to consist of a short, concise leaflet to be freely distributed, the other to consist of the more elaborate catalog not placed out in the open for everyone to take but only given to real prospects.

(7) I feel that prices should be F.O.B. factory as in the case of automobiles with information available on the approximate shipping of air delivery extra involved in making delivery to other destinations.

(8) I do not feel that the present condition of the industry would permit of making a guarantee on prices through any set period and that although all exhibitors should attempt to stabilize conditions to the utmost, nevertheless, it would be fruitless to attempt to set down rules and might be decidedly harmful.

(9) I feel decidedly that the attitude toward children should be broadminded, patient and generous. There should be a very free distribution of leaflets of the character above mentioned to children and there also should be a decided disposition whenever possible to answer questions which may be forwarded.

(10) I am sure that the state of the industry now requires the continued application of improvements when they are worked out and when it is certain that the improvement is real rather than imaginary. New models will almost always logically be ready for display in the Spring at the time of the show so that this aspect will automatically take care of itself.

KEEP DEMONSTRATORS GOING STEADILY

By Walter C. Davis

Davis Aircraft Corporation

FROM a manufacturer's sales angle the dealer and distributor appeal is most important, following in importance to those already professionally operating aircraft. The expense of direct sales to the public is prohibitive and a manufacturer must necessarily build a distributing and dealer organization in order to procure proper representation and adequate sales outlet.

(2) Evening attendance largely consists of the local public, and a representative in evening dress adds dignity to the exhibit and the show in general after the dinner hour.

(3) Cutaway models are always interesting to the public just as an automobile chassis in an automobile show.

(4) The enormous amount of damage done to exhibits by both children and adults at previous aircraft shows and the fragile character of aircraft and danger of damage in inexperienced hands makes it almost imperative for the show authorities to protect the exhibitors in some manner.

(5) It is our experience that one plane on the field is worth several in the show. Demonstrating planes are kept going steadily for those who are interested.

(6) Publicity matter of simple leaflets is advisable for show distribution.

(7) We quote F.A.F. prices altogether.

(8) The guaranteeing of list prices is very dangerous. It is well to have an understanding with the distributor or dealer, but utterly impractical to guarantee any retail prices.

(9) School children are future buyers, but they should be kept in hand. Simple inexpensive printed matter can be provided.

(10) The annual model has cost the automobile industry tremendous sums, and as the engineering and approval requirements on aircraft are entirely different from automobiles it appears that the introduction annually of new models in the aircraft industry would be a tremendous hardship.

QUOTE PRICES "FLY-AWAY SHOW"

By Merle F. Cornell

Sioux Aircraft Corporation

THE special appeal of an aircraft show should be directed to the public at large as potential retail buyers. With this in mind our dealers and distributors will be taken care of automatically. Too much stress can not be laid on the fact that the average citizen is not yet aware of the fact that the airplane can be used in his daily business to most profitable advantage.

(2) Harmony and general appearance of an aircraft show is important. We doubt the advisability of having salesmen or anyone else connected with the various exhibits in evening dress at any time during the show. Neither do we think it proper to lay special stress on a flying field atmosphere. I see no reason why an aircraft show exhibit calls for evening dress or boots, helmet and goggles.

(3) Obviously, it is very desirable to call to the attention of every show visitor the structural details of an aircraft. Cutaway models, uncovered wings, etc., are interesting to those already in the business and will eliminate confusion in the minds of the laymen, who have little knowledge of aircraft construction.

(4) Our National Aircraft Show is intended for the public at large. Therefore, the average show visitor should be allowed to examine any part of an exhibit, get up as close to it as he chooses, and ask as many questions as he likes. On the other hand, there is no need to allow people to climb upon an exhibit unless the exhibitor so chooses.

(5) The matter of flying demonstrations during the aircraft show, to my mind, is a question to be determined by the individual exhibitor. Personally, I think it well to be most generous with demonstrations as my experience has taught me it is most difficult to ascertain just who is the prospect, and oftentimes the casual observer,

or the party who is sincerely a most cautious passenger, can be sold an airplane right on the field.

(6) The matter of distribution of literature, of course, is up to the exhibitor entirely. My policy has been to provide two distinct types of pamphlets. One to be a small inexpensive leaflet that may be passed out freely to all visitors at the display, and the other a more elaborate description of the construction and general appointments of the ship.

(7) It will avoid much confusion at a National Aircraft Show if everyone would display fly-away prices at the show locality.

(8) The manufacturer who is confident that he has the proper type of airplane to fill the need for some particular phase of commercial aviation, may readily guarantee maintenance of list price for a period of months.

(9) By all means welcome the school children. The matter of passing out literature to the youngsters should be left entirely up to the manufacturer in question.

(10) I believe there is little to be gained by offering an annual model to be introduced at show time. On the other hand, if we have faith in our basic design, more good will can be worked up by continually making improvements on our various models throughout the year. I am of the opinion that the annual model tends to retard sales prior to the showing of the new airplane and has a tendency to depreciate in excess the value of the model when a new design comes in to take its place.

LIMITED ACCESS TO EXHIBITS FOR PUBLIC

By H. C. Ritchie

General Electric Company

THE chief reason for an aircraft show should be national publicity and at the same time serve as a place where aircraft distributors can be shown new models and informed as to policies and prices. The local public should be considered not as potential buyers of aircraft but rather as commercial supporters of the show.

(2) The show atmosphere should not be that of the flying field but might be that of an up-to-date air terminal. In other words, comfort rather than dust; good appearance of the exhibit and, of course, the exhibitors is desirable.

(3) The general public will be interested (except in a few instances) in the complete aircraft or device only while attending distributors and pilots will be interested in performance on the field and to a minor degree to structural details.

(4) Again, necessary distinction should be made between the distributor and the visiting public in the freedom allowed in handling exhibits. Distributors, pilots and others of the industry should be welcome inside the ropes, while an effort should be made to keep the general public far enough away to prevent damage to fabrics, etc.

(5) Demonstrations should be given freely to distributors, dealers or prospective immediate purchasers.

(6) Complete catalogs should be available for dealers and users while simple leaflets used for general distribution.

(7 and 8) No comments.

(9) The show should be opened for one afternoon for school children but they should be under proper supervision and exhibitors "warned" well in advance so that the proper preparations could be made.

(10) No comment.

CENTER APPEAL ON THE REAL PROSPECT

By Stanley W. Jacques

Keystone Aircraft Corporation

AS a result of our participation in the major aircraft shows of the last four years, we have formed certain opinions regarding their conduct and purpose. We believe the appeal should be directed at prospective purchasers and that if this is done it will have the proper appeal to dealers, operators, and the general public.

While the appearance of salesmen in the dinner clothes helps to set off certain exhibits, we do not consider that it would be desirable to adopt evening clothes as a general plan. The attempt of some individuals to adopt this form of dress detracts rather than adds to the picture as a whole and there is an air of aloofness connected with their adoption. Furthermore, it is very difficult for all the exhibitors to get away from their exhibits long enough to effect the change. The atmosphere of the exhibition should be one of neatness but ordinary business suits should be worn.

The visiting public should be allowed to view all exhibits at close range but under the supervision of a company representative. As regards demonstrations, since they are naturally costly they should be limited to prospective purchasers. We have made a practice of distributing leaflets in limited quantities to the general public and keeping elaborate catalogs for distribution to actual prospects.

Guaranteeing of prices is not good business practice to our way of thinking, though we have no intention of making any price cuts. The price can be flyaway or delivered, to suit individual cases, since the aviation industry has not yet arrived at the volume of sales that requires adoption of a fixed policy in this regard. We do not believe a general policy of bringing out new models at show time is desirable. In our case a new model may be produced in time for the annual show or to meet certain requirements arising during the year.

EVENING DRESS A BARRIER

By H. R. Perry

The Waco Aircraft Company

THERE should be no special appeal in the National Aircraft Show for the reason that it represents combined groups catering to entirely different situations and services. All our interests are mutual in the end, and the appeal should be to the public, non-flying as well as flying.

I sincerely feel that evening clothes are a detriment, insofar as they build a barrier between the salesman and the visitor not so attired. We are striving to put our industry on a sound business basis, and I believe business clothes should be worn at all times in the booths, until such a time as the majority of evening visitors are in formal attire.

As we are still in the early educational stages with the majority of our visitors I believe the fullest educational features such as exposed areas are desirable.

I think the grown public should be encouraged to handle and enter the airplanes and urged to become familiar with their method of operation. Roping off gives an impression of delicacy that is not advisable and does not tend to build confidence in the product.

I think demonstrating effort should in no way be confined to operators and owners, but every effort should be made to include non-flyers who should be interested —our only hope of ever building any sort of a volume market.

As long as hordes of children are allowed to run like wildfire through the show, it is imperative to confine literature to inexpensive leaflets. No normal advertising budget could stand the cost of expensive catologues the way the children consume them.

Prices should be given F.A.F. at a national show. Local delivered prices in Detroit mean no more to the man from Pittsburgh than the factory price, less in fact, and the public in their automobile purchases are thoroughly educated to delivery charges.

I am opposed to price guarantees. If our costs are lowered either by reduced prices in purchased material or increased production, or both, I do not see that we should obligate ourselves to refund money to purchasers who bought during a period when such savings were not available. If the reduction is the result of a dumping process, the manufacturer should protect deliveries made in the preceding thirty days without guarantee. In any case, such a period as six months is out of reason.

Children are a problem that should be given a great deal of thought, even to the extent of permitting their attendance on only one day, unless accompanied by parents or guardians.

The shows that I've attended have been literally filled with police and firemen, who, however, have been entirely too busy preventing a tired salesman (on his feet from eleven to eleven) from the solace of a cigarette, to bother about the rowdyism of children. In my estimation, in a building like the one at Detroit, with adequate protection against fire, some of these uniformed worthies might direct their attention to preserving a reasonable amount of order amongst the well-meaning, but highly destructive "kids".

I think the aircraft industry need have no hesitancy in patterning after the automobile brotherhood in abolishing yearly models, adding minor improvements as developed and marking additions or changes at any time, except show time. This waiting for the new models at the show creates a 90-day dull period which is extremely costly and entirely unnecessary.

FEW CHECKBOOKS IN EVENING CLOTHES

By E. A. Johnson

Johnson Airplane and Supply Company

THE Annual Aircraft Show should be aimed primarily at the general public. Although the paid attendance is local, the general public can be reached through the press, trade journals and radio in such a way that they know there is a show and what it's all about.

(2) In the past our aircraft shows were well represented by democratic attitudes—some in rags, some in tags and some in velvet gowns. I would rather see the atmosphere of the flying field than that of the drawingroom as people are more apt to talk flying instead of scandal. Furthermore, people usually don't carry checkbooks in evening clothes.

(3) The complete machine is usually more interesting to the retail buyer. Show the completed article, tell how good it is, what it will do and let the engineers and competitors argue about details and construction when no customers are around.

(4) Give the public a free hand—let them finger, poke and sit in the planes if they look like customers.

(5) Demonstrations are really up to the sales managers. The more demonstrations the more sales (sometimes). It's hard to discriminate between a good prospect and a dud.

(6) Simple leaflets are cheaper to give out, but a register of prominent prospects should be mailed catalogues.

(7) Prices should be F.A.F. nearest factory, regardless of whether they are purchased in the locality of the show or not, except delivery of show jobs which should be F.A.F. that city.

(8) One should steer clear of price protection talk. If it does come up as an issue, however, it should be handled by a diplomat.

(9) Children should not be handed expensive literature intended for prospects. However, educational literature on aviation is good business. Children's day at the aircraft show should not be of great concern if they are kept from getting into aircraft or handling the exhibits.

(10) More publicity would be given aircraft shows and more interest shown if new models were first shown there—this would also have the effect of the public seeing something new and would give manufacturers an opportunity to produce a plane in some sort of production, instead of always expecting to get out something entirely new next month.

A SELLING PRICE ON TODAY'S COST

By J. E. Schaefer

Stearman Aircraft Company

SINCE distributors and dealers have been developed within the aviation industry to the high degree of efficiency that prevails in the automobile field, our problem is to "sell" to the public and thus create a demand sufficient to make the customary channels of distribution attractive and profitable. It seems, then, that the program for aviation is somewhat the reverse from that of the automotive industry. Since the automobile show is designed to concentrate on distributor and dealer personnel with the public occupying reserved seats, the aviation industry should concentrate on the public and thus provide a market in which proper sales organizations may function. Everything that will contribute then, to the development of a market for aircraft should be the aim of the national aircraft show.

Why an airplane flies has been written about many times, but you will be surprised what an interesting story it is to many who will visit the national aircraft show. You will also be surprised to learn how little is known of the aileron, the elevator, instruments or any of the common construction details of aircraft. Now and then it may be advisable to invite a particularly interested party to sit in the cockpit of an airplane and explain to him a few of the instruments and operations by which flying is accomplished. The wise selection of this party and a simple intelligent conversation will attract small groups around each exhibit.

We are endeavoring to impress those who attend the show that aviation is no longer a "game" but a "business". This to me implies a harmonious appearance. Evening dress tends to accomplish this. A cordial greeting to the public to investigate and inquire concerning our products throws into discard the "hands off" policy but does not necessarily imply that we are to permit displays being "manhandled." As for demonstrations, these should occur in number and kind that will produce *sales,* present or future. Every demonstration should be a step toward a sale. The show, as I understand it, is inside—let's keep it there.

The policy concerning catalogs and their distribution, seems to me to be dictated by what is or what is not good business for each distributor.

Since the majority of our deliveries have been "flyaway" and since, that, I believe, is the more generally accepted method of delivery, the F.A.F. price seems to me to be the more acceptable. Any price that is quoted should be quoted firmly and definitely and if an explanation is necessary at all, it should be on the basis that the price is set to provide a fair profit and is based on the best cost information available at the time of quotation. The customer should be convinced of the fair and honest methods of the particular manufacturer whose aircraft he is investigating. The selling price should be based on cost *today* and not six months hence, therefore a guarantee against price decline is impracticable without setting up a reserve to meet the guarantee. The policy as discussed applies to individual purchasers only. Protection on distributors' and dealers' stock is another problem and the automotive industry has established a worthy precedent that may be followed with confidence when this phase of the subject is to be discussed.

Development of aircraft and aviation should be continuous—improvements should be made as soon as they have been proven practicable. We can not afford to wait a year for new ideas to be introduced. We should strive for an even sales and production curve and yearly models tend to defeat this purpose.

Children should be accompanied by a chaperon or parent. To admit large bodies not properly conducted or chaperoned, is trying on the exhibitor, often destructive to the equipment and uses an amount of the exhibitor's energy in a few hours that could be much more profitably expended if left for the entire day's work.

ANNUAL MODELS IN A JANUARY SHOW

By W. A. Mara

Stinson Aircraft Corporation

SINCE the aircraft show is a national show, I believe that the utmost national publicity should be given to it; however, because the show must depend upon paid admissions for support and since these come from the locality in which the show is held, publicity should be aimed at the local public as retail buyers, at dealers and distributors, as well as those professionally operating aircraft.

(2) The space rented by a company at an aircraft show is that company's business office for the time being. A man does not go to his office in the morning, nor does he do business at any time of the day in evening clothes; therefore, I feel that business clothes should be worn at aircraft shows. Neither do I think that men at aircraft shows should wear goggles and helmets. In other words, I think that the atmosphere of the exhibition should be neither of the drawing room or flying field type, but rather should assume its true function of a business enterprise and should be clothed as such.

(3) I think this is a question which the individual manufacturer must answer for himself. If he believes that by means of stripped wings or cutaway models he can best display his product to advantage and best outline his sales points, then the choice is his to make.

(4) Part of the public's reticence with respect to airplanes is traceable to the fact that they do not know enough about them. If we exhibit planes at aircraft shows so that people may see them at close hand they should, I believe, have the utmost freedom in being able to see, touch, ask questions about and sit in the airplanes to the end that they might have a better knowledge and, therefore, greater confidence in them.

(5) It has generally been our policy to give a great many demonstrations, trying, to the utmost of our ability, to see that demonstrations were given only to such persons as were capable of buying airplanes.

(6) This is another question that the exhibitor must decide for himself. Ordinary good business and an analysis of the cost per sale will indicate the correct answer.

(7) Since the aircraft show is a national show I believe it only fair to quote the price of the airplane at the factory. The exhibitor of course, should be prepared to answer specific questions by quoting the delivered price at any point.

(8) I do not believe that price alone, without quality, will sell any sort of a product over a long period. Long term guarantees will not make inherently cheap products popular. In other words, guarantees do not make values, as values are inherent in themselves; therefore, I feel the best answer to this question is answered by the product itself, the reputation of its builders and the manner in which these two cardinal points are presented to the prospect by the salesman.

(9) I think children should be encouraged to come to aircraft shows. I have found that the majority of children at aircraft shows have good manners.

(10) I believe manufacturers will always keep their models secret to the best of their ability until they are ready to announce them. I do feel that aircraft shows should be held as early as possible in the year so that people may know that if there are new models they can be seen at that time. This would do away with the element of uncertainty in the mind of the buyer. I think the two most important elements are, first, that the public be taught that the manufacturer will have ready new models in January, and, second, if the show is held in January, the manufacturer has twelve months in which to sell his product. Because the date of the present show comes in April it means that at least three and one-half months of the year have gone by before the manufacturer sets out to sell his 1931 products.

TOURING EUROPE BY PRIVATE PLANE

By LeRoy Manning
Chief Test Pilot,
Ford Motor Company

This map shows only principal cities visited by Mr. Manning. Many of these routes were flown several times

THE American pilot, flying from state to state within his own country, does not realize how fortunate his position is with regard to freedom from governmental control and interference. He may be asked when he lands at an American airport, to sign the register, stating his name, arrival and departure, etc., although even this is sometimes overlooked. His traveling equipment often consists of his pilot's license, and a checkbook. He takes off when he pleases, without saying a word to anyone; flies wherever he chooses, and, when he lands, nobody asks him whence or whither. He can travel from the Atlantic to the Pacific in this free and easy fashion—certainly an ideal state of affairs.

On the other hand, when the American pilot starts across Europe, flying a privately owned machine, he encounters a barrage of official red tape which is either discouraging or amusing, depending upon his temperament and in how much of a hurry he is. The formalities and delays at some European airports are so preposterous and stupid as to be almost unbelievable to anyone who has not witnessed them.

Let us suppose we are leaving Croydon, the airport of London, for the first time, bound for some point on the Continent. First, we must pay our bill, and we find that in addition to the charge for hangar space we must pay a landing fee of 30 shillings (about $7.25) for every landing we have made on the airport. We roll our machine out of the hangar, and are preparing to start when an airdrome official asks us if we have prepared our papers. "What papers?" we ask. "Why, *all* the papers!" he replies, somewhat grieved at our ignorance. We go back to the offices, and are informed that, in addition to the examination of our passports, we must present our log books. For a three-engined airplane, we must carry five log books, all of a special form, printed and sold by the government printing office. They are the "Journey Log Book," the "Aeroplane Log Book," and an engine log book for each engine—no small library. In addition to these, we must have a "Triptique" or "Carnet de Passage," as it is called on the Continent, for customs requirements. Making the necessary entries in this is a long and arduous process. Having finished with these, we start in on the real work of the day. We must make out our "Passenger and Baggage List" on a special form provided for that purpose. Then come two copies of the "Air Navigation Report," after which we make out three copies of the "Manifest of Cargo." Some of these forms are not available at the airport offices, and we must go to the Imperial Airways' offices and borrow a supply. If passengers are carried, more forms must be attended to. I learned to sign all my passengers on as members of the crew for the sake of saving time, and I have left Croydon with as many as three assistant mechanics, several cabin attendants (female), and a half dozen radio operators. If you contemplate starting from Croydon on a continental tour in a private machine, my advice is to go to the airdrome the day before and get the necessary paper work in order. To American pilots this may sound ridiculous, but it is sound and serious advice. In spite of all the delays, Croyden is a pleasant place, and although the English officials insist on carrying out all the formalities and duplications of their quite unnecessary paper work to the smallest detail, they are polite and considerate about it;—some of them, actually sympathetic. The best feature of Croydon is that the officials of the airport staff do not dress themselves up in glittering uniforms and scowl suspiciously at a stranger as they

do in some continental countries. So, although you will take off from Croydon cursing softly, and thoroughly exasperated with the unreasonable formalities, I predict that you will be glad to get back there upon your return from the Continent, for, in Croydon, you can at least make yourself understood.

THE English meteorological service is, in my opinion, the best in Europe. The reports are frequent, complete, and remarkably accurate. The English maps are better than anything I have seen in America. The scale is very large (about 3½ miles to the inch), and every detail is beautifully represented. As used by the Imperial Airways, the maps are made up in book form, about ten inches square, and waterproofed. They are very expensive—too expensive for the occasional traveler—but well suited to airline work. The radio system used is different from anything in America, and it is quite worth while to visit the control tower at Croyden and see it in operation. Two-way telephone is used, and navigation in bad weather is carried out by the triangulation method. The pilot requests his position; three stations (one of them Croyden) take the bearing of the machine with their directional antennas. The two outlying stations advise Croyden the bearing of the machine from their positions. The operator at Croyden, by an ingenious and beautifully simple device, plots the *three* bearings of the machine. Where the bearings intersect, the plane must be, and the pilot is advised accordingly. It requires about two minutes to obtain this "fix."

Few people are aware of the extremes of pleasure and annoyance that are the lot of the private owner who attempts to tour Europe in his own machine. In the course of two summers Mr. Manning visited practically every airdrome of importance on the European continent in the interests of the Ford Motor Company. Out of this experience he offers a number of suggestions which should prove invaluable to anyone who is contemplating taking an airplane abroad for private use.

Altogether, I believe the American pilot will enjoy his stay at Croyden. The hotel on the airport is good, the food excellent, and there is much to keep him amused. The fact that there is no soap, and only a very dirty roller towel in the public wash room is only one of the many minor inconveniences to which one gradually becomes accustomed. We taxi out for taking off, and are given the "clear" signal from the control tower by a small searchlight with a concentrated beam which the control officer aims at the pilot by means of an ordinary gun sight. We take off, and the charming English countryside stretches out before us. And here, for the first time, the American pilot, particularly if he is from the Middle West, finds himself in really strange territory. Roads, railroads and fences turn and twist continually; fields are round, triangular, and every other conceivable shape. There is no possible way for a stranger to get from one point to the other except by following a carefully prepared compass course which must be entered immediately after leaving the airport.

If we are going to Paris, and have no radio, we must circle the airdrome at Lympne, on the English coast. The operator there advises the French coast airdromes that

Over Vienna

a machine of a certain license number is over the channel. When the machine arrives at Boulogne, on the French coast, the pilot must circle again. The French operator then advises the English station that the crossing has been safely made. It is not necessary to go lower than 3,000 ft. to signal these airdromes, as the observers use powerful field glasses, and acknowledge the ship's signal by flashing lights.

And so to Paris. Le Bourget airdrome is large and fairly well equipped. We circle the field to the left, as is the universal custom at European airports. The wind direction is indicated by a smoke pot on the field, as it is on nearly all important continental airdromes. This is an airdrome accessory that American operators might well adopt, as it is the one perfect wind direction and velocity indicator for daylight flying. At night, the smoke pots are sometimes illuminated, but more often an illuminated wind tee is used. We land, and taxi aimlessly up and down the hangar line wondering where we are supposed to put the machine. Nobody seems to know. At American airports of this size and importance a half dozen operators would be out waving us frantically up to their own particular gasoline pumps, but nothing like that ever happens over here.

At Le Bourget we are again subjected to endless customs formalities, and we have the pleasure of dumping all of our baggage out on the inspection tables. Entries in the log books must be made on the spot and officially sealed and stamped. Passports must be examined, and various papers filled out; the Triptique must be filled out and submitted, etc. Gasoline and oil are obtained only after many long and heated discussions, as is the Continental custom.

And so we go on through Europe; some places good, some bad, some very bad. The one thing that is always the same is the endless formality of European officialdom. No matter where we land, we never escape the brass buttons and the pompous officiousness of the local authorities. A few examples: In Rome, where I once landed on a Sunday afternoon, on my way to Naples, I was held over night because the customs officer did not arrive until three hours after I landed. In Brindisi, a small city down in the heel of Italy, where we landed for gasoline, we were in a hurry to be on our way over to Greece. But we had to remove the cowling from all three engines so that the local customs authority could examine the name plates on the engine crankcases and ascertain if the engines were the same as those named in our log books. Just what difference it could have made to him I was never able to learn. In Albenga, Italy, a small town on the Italian Riviera, between Monte Carlo and Genoa, I once landed in a small intermediate military field, due to shortage of fuel. I was immediately arrested and held over night because I had landed without permission—and permission had to be obtained formally from Rome before I was released. There were no other airplanes on the field, and nothing of military importance to see, but that made no difference.

Another peculiarity of European aviation is the "prohibited territory" idea. On all flying maps are numerous areas, shaded in red, and marked "flying prohibited." These areas are of various sizes, from one to twenty or more miles square, and flying over them is prohibited supposedly for the protection of military secrets. Apparently European military people know little of psychology, for if there is anything that will make the average person curious about a place it is warning him that he must not see it. Flying directly over the city is prohibited in Paris and in many of the other large capitals. Where flying is permitted, it must be done at high altitudes. The visiting pilot is advised of the local rules as soon as he lands. Accordingly, if you wish to have a good view of the old world capitals from the air, you must fly around over them before you make your first landing.

The Ford plane over Malmö, Sweden

Through the Balkan states one encounters many interesting—and sometimes annoying things. In one Balkan country, visiting aircraft are strictly forbidden to carry radio equipment. In the next country, only an hour's flight in distance, radio is required by law for *every* aircraft carrying five or more persons. I am eagerly awaiting the time when some visiting ship tries to get through with more than five people, as I would like to know the answer to this typical Balkan riddle. It was in the Balkans, incidentally, that I found the very last word in the solution of the problem of bad weather flying. In Belgrade, the capital of Jugoslavia, they put all their commercial airline machines in storage in October, and take them out again in April. Whether they are years behind the times or years ahead is an open question which provided our party with material for many eloquent and impassioned debates.

Progress through these countries is slow. One soon learns that it does absolutely no good to try to hurry the officials in the performance of what they consider their duties. The more you admonish and threaten, the slower they move. The only really effective way to hurry things along is to offer what I shall call, for the sake of politeness, a tip.

I consider the finest flight in Europe that which crosses the whole range of the Alps, from southern Germany into northern Italy. The scenery is indescribable. Do not attempt this flight, however, except in perfect weather. During the winter months, the cities in the Po valley usually have ground fog in the early morning and late afternoon, and the only really good flying weather is in the middle of the day. This flight can be made comfortably at 15,000 ft., although some of the peaks are higher. Personally, I should not care to make this flight in a single-engined machine.

Another fine flight is from Marseilles along the French and Italian Riviera, and down the coast of Italy to Naples.

Greece is another beautiful country when viewed from the air. The climate is exceptionally fine, and the atmosphere has a peculiar clarity which allows remarkable visibility.

North from the Mediterranean, through the Balkan states and the smaller countries of central Europe, there is little to interest the air traveller, although the larger cities are worth a visit. The best route is Salonika, Sofia, Bucharest, Belgrade, Budapest, Vienna, Prague, and then through Germany. This journey is a difficult one in the winter months, and the American pilot flying it for the first time should plan to complete his trip through this region before the first of November.

In Germany there is much to see. Some of the smaller towns of central Germany, in the region about Nürnberg and Bayreuth, are so quaint and picturesque as viewed from the air that the American pilot, accustomed to modern industrial towns, can scarcely believe his eyes. The airports at the larger German cities are probably the finest in Europe. The one in Hamburg, particularly, while not so famous as Templehof in Berlin, is much finer and more modern, and represents the latest European development in airport construction. In Germany one sees one of the few serious European efforts to develop night flying, and I can best describe the system by saying that the average American night mail pilot would quit his job and go back to the farm if he were asked to fly with the equipment used over there. The course lights are small and far apart, the country very bad for forced landings, and no parachutes are provided.

A word about navigation in Germany. I have never encountered anything so difficult as flying through the southern and western industrial regions of Germany. The country is densely populated, and the railroads, roads, rivers and canals, towns, and other landmarks follow each other in such quick succession that while the pilot is looking at his map he crosses over a half dozen checking points. If the weather is at all bad, it really requires two men to navigate accurately. I have flown into Germany six times, and on two of the six occasions I have encountered bad visibility and have wandered from my course, which, incidentally, disproves the old legend that there never was a pilot who admitted he was lost.

In Holland one expects canals and windmills, and he is not disappointed. The Royal Dutch Airline, commonly known as the K.L.M., impresses me as being the most business-like organization of its kind in Europe, and I venture the prediction that it will be the first airline in Europe to free itself from the entangling net of the subsidy system and show a profit as an independent enterprise.

Denmark should be included on any comprehensive European air tour. The airport at Copenhagen is very fine, and is a base for both land and seaplanes. The neat, orderly appearance of the countryside reflects the temperament and habits of the people of this beautiful peninsula.

If one has an opportunity to visit Russia he should certainly take advantage of it. The route from Berlin lies up through the Baltic states by way of Danzig, Konigsburg, through Lithuania and Latvia to Riga. This is not a particularly interesting flight, being mostly flat, level and somewhat marshy land. Leaving Riga, we go east to Smolensk, Russia, an ancient walled city of considerable historical importance. Moscow is the next stop. We were never more cordially received than we were at Moscow. The official formalities are refreshingly absent; even our baggage was not opened. The Moscow airport is modern and well equipped, and is one of the busiest in Europe. The Russians are building and operating all-metal airplanes of their own design, both single and multi-engined, and they appear to be excellent ships. They are operating some of the longest airlines in the world, several of which are flown at night. Aerial photography and survey are carried out on a large scale from the headquarters in Moscow. The aviation group in the Russian capital are eager, enthusiastic, and well informed.

I am often asked about the old battle fields of France as seen from the air. Are the trenches and other marks of war still visible from the air, and if so, where? One of the best trips for a view of this territory is from Antwerp or Brussels direct to Paris. This trip covers the old trench lines near Mons, St. Quentin, Soissons, etc. Another good view of the old trenches of the Western Front can be seen in a flight up the valley of the Marne and Aisne rivers, between Paris and Strausburg. Where the trenches lie in cultivated land, they have been filled in and ploughed over, and they are invisible to the visitor on the ground. From the air, however, the trench lines stand out in high relief due to a discoloration of the soil where the trenches formerly lay. As one flies along he can see the zig-zag lines stretching out for miles on each side, sometimes close together, sometimes widely apart. Where the trenches were dug in soil not suitable for cultivation they are quite unchanged. These spots are usually far back in the hills, miles from roads and railroads, and I believe few tourists see them. At railroad junctions, and other important communication points, one can usually see traces of shell holes in the surrounding fields.

To those planning an aerial journey over Europe with a privately owned airplane, either for business or pleasure, I offer the following suggestions:

1. Make the journey between April and November, if possible.
2. Order maps at least two weeks in advance. The Automobile Association in London is prepared to furnish these if desired.
3. Permission to fly over foreign countries should be applied for at the American Legation in Paris.
4. Secure a "Triptique" from the Automobile Association of London. It greatly simplifies custom procedures.
5. Do not attempt to smuggle cameras in your machine, as the penalties are very severe. Few European countries allow a private machine to carry a camera.
6. If you want pure gasoline without benzol mixture, special arrangements will have to be made at each airport in advance. Standard grades of aviation oil are readily available.
7. Carry plenty of spare parts. Spark plugs can be had over there, but almost nothing else fits American machines.
8. Don't bother with radio equipment unless you are an excellent linguist.
9. Carry as little luggage as possible. If you must have souvenirs to take home, buy them in New York after you return. They are cheaper there, and it saves trouble.
10. Be patient, and never allow yourself to become perturbed.

TACOMA PUBLIC LIBRARY

THE AERONAUTICAL CHAMBER CARRIES ON

Charles L. Lawrance
1925-1926, 1931

PAST PRESIDENTS
OF THE CHAMBER

Frederic B. Rentschler
1930-1931

SPOKESMAN, mediator, coach and co-ordinator—the Aeronautical Chamber of Commerce fills many rôles and performs many functions as the industry's trade organization. It recently completed its tenth year of service, emerging in the strongest position it has yet occupied. During that year the Chamber tuned up its machinery and won additional support at a time when many units of the industry were headed toward disintegration. Of course, it had its own little set-backs, but an ability to make adjustments and a fundamentally sound program brought their reward. This month it figures prominently in one of its main functions—the conduct of a national show. This year the Chamber co-operated with the Detroit Board of Commerce in this work.

That it was not all plain sailing is partly evidenced by the fact that during the year $22,500 were wiped from the Chamber's books. The collapse of many anticipated collections, chiefly from such sources as the membership fees, was a real blow; it forced the curtailment or abandonment of certain projected programs. However, the organization finished the year in a better cash position than the year before. Though forced by the trend of the times to face 1931 with a considerably reduced budget, no appreciable curtailment of its fundamental functions is contemplated and there is to be timely expansion along a number of lines.

Nor was the year devoid of mistakes. In fact, the Chamber would be among the first to admit that neither as a whole nor in part does it "know it all." As the industry's representative in relations with the public and with government departments, it has experienced a strengthening of mutual respect and a better understanding of various and conflicting viewpoints. The aviation picture changes constantly. There must be frank retractions from time to time. Difficulties of no small caliber are sometimes contributed by competition and feeling among units belonging to the Chamber, a reflection of the depression and the struggle for survival.

Since its organization in 1921 the Chamber has grown from a membership of about 100 to 746. It occupies a unique position and has a peculiar form designed to suit; there is definite need for such a superstructure and probably no other kind could fill its shoes. It has no will of its own; that is, it does not exist of and for itself; it is a bridge between all the units within the industry, adhering to it, and operates as an agent, not only for their collective purpose but for the purposes of any substantial group. It should be emphasized in this regard that one of its basic principles is the placing of all actual leadership, decisions and authority in the hands of sections and committees composed of members, or representatives of member concerns. The responsibility of the Chamber's staff is for execution, only incidentally for initiation. Another basic principle is that each section enjoys virtual autonomy.

The operating units are called sections and committees—the former comprising the combinations of members of the Chamber grouped by common interest, the latter comprising individuals charged with the handling of special elements of the Chamber's program common to a number of sections—such as legal and legislative matters, or insurance problems. Each section and committee (the sections appoint sub-committees, also, to carry out phases of the section's programs) is assigned to a salaried secretary or manager who assists the groups on a full-time basis. The entire permanent staff is located at New York, with the exception of a few clerks at Washington.

The Chamber has sought to avoid over-centralization by the introduction of six geographical sub-divisions, each presided over by a regional vice-president. At present, however, not many activities lend themselves to such a breakdown. The work of the airplane and engine manufacturers, for instance, is naturally centralized, although committee meetings are held at widely scattered points to suit the general convenience. Regional organization exists to provide machinery for whatever research

activities, conferences, or shows may be desired, but most of the time it is non-active.

The Chamber's activities fall under three general heads —Relations among its members; relations between the members and the federal government; and relations between the members and the non-aeronautical interests.

What has the Chamber been accomplishing in respect to the relations between its members, the industry itself? This responsibility, of course, comes first; upon its success in securing internal solidarity and smooth interlocking of operations depends its effectiveness.

An excellent example of how the Chamber may serve as an informal court of trial and appeal in "family" disputes has been afforded by the airplane and engine manufacturers sections. Early in 1930, the discount question between the plane and engine manufacturers had become troublesome. The plane manufacturers had asked for a much more favorable discount rate on engines. The engine manufacturers had replied that in their opinion this lowering of their income would force curtailment or elimination of engine servicing by the manufacturers. Were the plane manufacturers prepared to assume this obligation for the sake of lower engine costs, and if so, was that in the long run the best method of handling the servicing. When the smoke had cleared away it was agreed that the existing conditions should continue with slight changes. The Chamber provided the machinery whereby this understanding could be reached.

Lester D. Gardner
1929

Paul Henderson
1927-1928

Frank H. Russell
1924

Inglis M. Uppercu
1923

Grover Loening
1922

S. S. Bradley
1921

As in every trade organization, one of the Chamber's most valuable contributions lies in its intelligence service. this includes the collection, arrangement and dissemination of pertinent reports, statistics and compilations of opinions—raw material for individual and collective administrative machinery. Periodic bulletins cover such subjects as transport and airport statistics, production and sales reports, Department of Commerce licensing data, and patent grants. Other bulletins covering legal and legislative matters, bids asked or contracts awarded by the Army, Navy and Commerce Departments, and special events (such as the Bratton bill to place airlines under the Interstate Commerce Commission), are issued as occasion demands. Of special significance is the fact that the industry has such confidence in the Chamber that practically all companies supply it with complete confidential production and sales reports from which impersonal summaries are derived for trade distribution.

A WIDE variety of assignments are given the various committees. For example, there is the undesirable condition of widely differing hangar rental and servicing fees now in vogue. A proposed formula was worked out for a uniform hangar rental system and distributed to the airport interests for study and revision—an important step in the evolution of an acceptable system. A suggested standard airport accounting system also has been under preparation for some time.

In its three-way relationships, the Chamber has been extremely useful in the industry's contacts with the federal government. As a means of expressing the industry's point of view or as a general buffer between the two, it has been particularly prominent in negotiations between the plane and engine manufacturers, and the engineering and regulating sections of the Aeronautics Branch, Department of Commerce. The Manufacturers Aircraft Association, it should be recalled, is now entirely separated from the Chamber, and the latter now has nothing to do in regard to cross-licensing agreements.

The latter half of last year affords a notable example of governmental relations. The plane and engine manufacturers' sections in a two-day meeting in September first co-ordinated its own reactions to the Department's proposed changes in the federal airworthiness requirements, and then presented a united front to the Department at a joint conference on the third day. Thus the manufacturers, whose bread and butter depend upon the construction which the Department by law supervises and regulates, were able to present an impressive concentration of opinion on requirements and practices which

were to be controlled by the government from its essentially different point of view.

The conferences were eminently successful. They were carried out in a spirit of co-operation and mutual sympathy. Important concessions were made on each side; controversial ground (troublesome in other years when the manufacturers had been less organized) was passed over harmoniously; and the revised requirements have emerged in more satisfactory form for all concerned than ever before.

For example, the manufacturers considered the Department's proposed definition of low- or light-powered craft to be incomplete through omission of specific mention of the size of the machine or the characteristics controlling the minimum speed. It was suggested that light aircraft be defined as those having a gross weight of less than 1,000 lb., a wing loading of not more than 6 lb. per sq.ft. and at least 4 sq.ft. of wing surface per horsepower. This recommendation was adopted by the government. Again, the manufacturers requested that on planes equipped with an engine of less than 100 hp. small fire extinguishers of 1 pint capacity be permitted. This also was adopted by the Department.

THIS give and take, this interplay of ideas and decisions, were possible through the following routine during the last six months of 1930:

1. Promulgation by the Department of its proposed revision in the airworthiness requirements and submission to the manufacturers. 2. Consideration by the manufacturers and collection of their reactions and suggestions by the Chamber. 3. Conference of the manufacturers' section at Washington for consolidation of reactions. 4. Conference with the Department. 5. Reply of the Department stating concessions or explaining stand to the manufacturers. 6. Consideration by the section's executive committee of the reply and submission of comment to the Department. 7. Announcement by the Department of final status of points in question and placing in effect as of Jan. 1.

The transport section promises to figure very prominently. It is but now approaching the true level of its effectiveness because of delays in mustering the operators to the Chamber's program. In the late Autumn members previously unsympathetic with the Chamber's transport organization swung into line, the American Air Transport Association was absorbed ,and the section gained an impressive momentum. However, this section was by no means idle in the past.

The airport section has been most active within the industry itself, particularly through its annual conference. It co-operated with the government, however, in such events as the holding of sprinkler tests for hangar fires at the Bureau of Standards a year ago and in the study of zoning.

Relations with the lay groups—including the state governments and the general public—have been very effective, though less adaptable to measurement.

Insurance, that great stumbling block to the progress of aviation, is one of the chief worries under this heading. Cheaper rates and better terms from the insurance companies are desired by the aviation operators and the general public which might use aviation. And, since traditional conservatism and the lack of knowledge of aviation accident conditions together are responsible for the unfavorable attitude of insurance interests, the Chamber's insurance committee and transport section are compiling complete, accurate statistics each month to provide the cumulative information needed. The Actuarial Society of America accepts these data as a basic element in its aviation accident and performance research. There is under way, too, an analysis of insurance costs to determine by experience over a period of time what insurance items may be eliminated or reduced in expense to the end that the total insurance investment be materially lowered. In the furtherance of its record in the eyes of the insurance companies and the general public, the industry has been urged by the Chamber to adopt and practice certain fundamental safety codes.

AIRCRAFT shows have been a bug-bear for the manufacturers in recent years. Certain shows were welcome, to be sure, and the Chamber itself has held several through its Aeronautical Expositions Corporation. The show problem arose from the activities of many professional promoters who entered the field to capitalize public interest in aviation, and from the multiplication of requests from small, disconnected groups for participation in exhibitions. The obvious strain from adherence to even a small percentage of these requests was made worse by the frequent resort to intimidation on the part of the show managers to secure the exhibits against the wishes of the manufacturer.

Last year the industry through the Chamber staged and won its fight to establish the principle that it could and would dictate its own show policy, the climax being the New York Aircraft Salon last spring. This year there is to be one large show—this month at Detroit.

The Chamber has swung into this year's program with avowed emphasis on four main objectives—increased aggression in legal and legislative matters, a strenuous merchandising campaign, improvement of its own internal organization, and refinement of its relations with various federal departments.

FOR some time a close watch has been kept on municipal, state and federal legal and legislative trends. A periodic summary of laws proposed and laws adopted has been supplied members, and certain outstanding items have been the subject of official action. Thus the Swetland case effecting the Curtiss-Wright airport project at Cleveland has been the object of much research, some of which is still in preparation. Representations made by the Chamber last summer when New Jersey summarily passed a blanket rule which, in effect, forbade all seaplane operation in that state, resulted in a modification amounting almost to abnegation.

Recognizing that important airport, taxation and licensing legislation and legal decisions are impending, the Chamber proposes to step up the magnitude of its legal service. Employment of an expert in such matters on a full-time basis, and the services of an exhaustive legal reporting system are included. While the Chamber does not intend to fight its members' individual battles it is prepared to take up the cudgels on cases of general and vital importance.

A year ago the Chamber sought a better balance between production and sales. Now it proposes to tackle in earnest the various phases of merchandising and sales promotion. Fundamental principles are to be studied, and a definite decision taken on the extent to which co-operative market research is practicable. A special committee on merchandising of airplanes has been recommended, and will co-operate through sub-committees, also, with the transport section in the promotion of traffic.

SERVICING AIRCRAFT INSTRUMENTS

Checking turn indicators

A recent Department of Commerce ruling requires that all air transport operators engaged in interstate passenger carrying maintain adequate personnel and equipment for the checking and maintenance of flying instruments. In view of this fact, Mr. Tate's article on the methods and procedure for servicing the more commonly used flight instruments is particularly appropriate.

By George Tate, Jr.
Pioneer Instrument Company

THE maintenance and servicing of aircraft instruments is one of the newer phases of aircraft operation. With one or two notable exceptions, it is only within a comparatively recent time that those charged with the upkeep of flying euipment have realized that periodic attention is required by the instruments as with the engine and other parts of an airplane.

The importance of this work is on a par with engine maintenance. The instrumental equipment of an airplane must be kept in perfect condition, for with the continued development of instrument flying the burden of responsibility resting on the instruments is steadily increasing. A faulty instrument is worse than none at all, and serves only to mislead a pilot who has learned to depend upon it. Safe flight in thick weather is possible only with the best equipment, and the confidence of the pilot that all possible care has been exercised to insure its perfect functioning.

Prevention is always better than cure. Although in this article we will outline a few of the necessary tests which will assist in locating trouble should it occur, let it be emphasized that a little time given to periodic inspection will in most cases avoid the necessity of any major repairs. Co-operation between the pilots and the instrument department of the airline is most valuable and necessary. Each is indispensable to the other, and if this viewpoint is taken, the utmost benefit to both will result.

To undertake instrument service properly, the airline must provide itself with the necessary calibrating and test equipment preferably set apart in a separate test laboratory and workshop. The latter should be well lighted and free from vibration from any adjacent shop equipment. With the test equipment, there should be provided one or two complete sets of instruments, the property of the service laboratory. These must always be kept in first class shape ready to substitute in an airplane. Rather than make a hurried repair, a faulty instrument should be removed from a plane and a "spare" installed in its place. The necessary repairs can then be undertaken in a thorough manner, and the instrument fully checked and tested before being replaced in the plane.

A competent instrument service man must be engaged by the airline to maintain the instrument department. Much care should be exercised in his selection, as the present demand for qualified personnel exceeds the supply. The succesful applicant should have a good technical knowledge, previous experience with aeronautical instruments, and be capable of accepting responsibility. As chief of the instrument section, his direct superior will be the chief of maintenance. The instrument engineer must organize maintenance and inspection schedules and keep a sufficient spare parts stock so that the possibility of a flight being delayed through instrument failure is remote.

All pilots should be required to fill in a form at the end of each run, listing any inaccuracies or failures noticed. The forms will then be turned over to the instrument engineer, who will make any necessary adjustments or replacements before the next run. The filling in of the forms in no way obviates the necessity of periodic inspection—rather emphasizes it. If the pilots never have anything to report but perfect performance, so much the better. It should, nevertheless, be reported.

The checkup and overhaul period for the instruments can conveniently be made coincident with engine overhaul, which generally takes place every 250 or 300 hours. At this time, all instruments should be removed and checked for calibration, wear, and appearance, whether trouble was previously evident or not.

A brief summary of routine maintenance procedure for the common instruments follows:

Tachometers

A TACHOMETER, well installed, should give no trouble, and does not require any other attention than the occasional removal and greasing of the inner drive

shaft. Cup grease of very good quality should be used.

Should the hand fluctuate, investigate the following:

(A) Inspect the shaft installation for sharp bends. In no case should these be of less than 6-in. radius.

(B) See that the outer casing is well supported and fastened to the structure so that no part can vibrate or swing.

(C) Check for friction by loosening the shaft at the motor end and revolving the inner shaft with the fingers. It should turn freely without binding during any part of a revolution.

(D) If excess friction is present, loosen the fitting nut at the tachometer end, and test again for friction.

(E) If the shaft revolves freely when disconnected from the instrument, the latter should be removed for checking and repair.

(F) Occasionally an instrument will be perfectly steady but appear to be definitely in error. The first point is to make sure that it is of the proper ratio for the particular engine. This being the case, the instrument is probably out of calibration, which can be determined by checking it against a master.

Pressure Gauges

OIL and fuel pressure gauges are universally of the Bourdon type. Both are of prime importance to the pilot, as any drop in oil or fuel pressure below normal indicates trouble.

Pressure gauges require no other maintenance than the periodic inspection of the connections.

Rarely, a leak will occur in the instrument at the point where the Bourdon tube is soldered to the connection boss. This can be repaired by soldering.

Should an instrument be thrown out of calibration by over-pressure, a new gauge is the only remedy. When subjected to excess pressure, the Bourdon acquires a permanent set and will not hold its calibration. The calibration should be checked periodically on a pressure gauge tester.

Thermometers

THERMOMETERS require no attention in service if well installed. The capillary tube should be well taped to the structure to prevent swinging or kinks. In no case should the capillary be cut. Any excess length should be neatly coiled and fastened.

Thermometers may be tested for accuracy by immersing the bulb in water which is heated slowly. A standard mercury thermometer should be used to obtain the temperature of the water, and to check the instrument under test.

Altimeters

ALL aircraft altimeters are at present of the barometric type. When used for measuring altitudes, a barometric instrument has definite limitations, due to the changing barometric pressures. Altimeters are calibrated to a "standard" atmosphere having for its zero a pressure of 29.92 in. of mercury. Atmospheric conditions are constantly changing, and actually this "standard" atmosphere exists on very few occasions.

To compensate for this effect, the dial of all altimeters is rotatable by a knob. The instrument should be set to zero before the commencement of each flight.

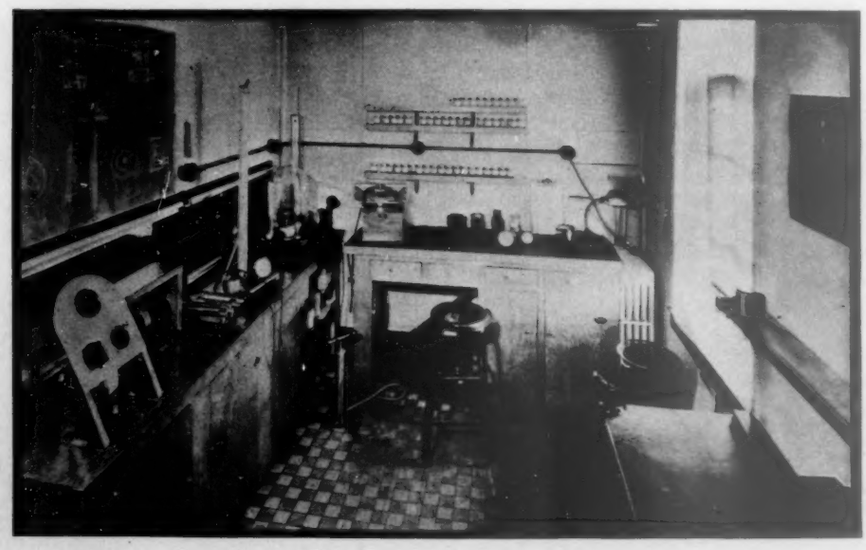
Altimeters are entirely self-contained and should give no trouble.

At the time the periodic overhaul takes place, the calibration should be checked before replacing in the airplane.

The necessary test equipment for altimeters consists of a special mercurial barometer with scale calibrated in thousands of feet; a bell jar; base plate with release valves; and some means of evacuating the jar, either a hand or power suction pump.

To test, the altimeter is placed in the bell jar and the reading of the mercurial barometer noted. As previously mentioned, the zero of the altimeter scale is 29.92 in. of mercury. If the barometer is above this, the zero adjustment of the altimeter must be so set that when evacuation is commenced, the altimeter hand and the mercury column both stand on the zero line at the same instant. At this point the barometric scale on the altimeter should give the same reading as the mercury standard.

The pressure should then gradually be reduced and readings taken at 1,000 ft. intervals to the limit of the altimeter scale, at which point the base valve is opened and air allowed to slowly re-enter the bell jar. Again the readings should be noted. Tolerances can be obtained from the manufacturer. Beyond this periodic checking, the altimeter should require no attention.



A good instrument servicing lay-out

Climb Indicators

THIS more recently developed instrument has now come to be regarded as one of the most valuable aids to the pilot. It is comprised of two units, the indicator and a thermally insulated tank, the two being connected by a short brass pipe.

The operating principle of the instrument requires that it be vented to a region of static air pressure. A vent is provided in the rear of the instrument for this purpose. Unfortunately, many airplanes, particularly cabin ships, are subject to peculiar cock-pit pressures, usually

evidencing itself in the climb indicator by a momentary descent indication when the plane is put into a climb, or a slight up reading if the throttle is suddenly opened. The remedy in both cases is to attach a piece of rubber tube to the vent at the rear of the indicator and explore the cabin or cockpit with the free end for a region of static pressure. Vented to this place, the climb indicator will function correctly, and a permanent installation can be made, replacing the rubber tubing with copper leading to the same point.

The zero position of the hand may shift slightly after the instrument has been in service. The hand may be returned to its position by means of the zero adjusting screw on the back of the case.

In checking the calibration at the overhaul periods, the altimeter test equipment plus the addition of a stop watch is used. The test procedure is as follows:

For descent readings, place the climb indicator and tank in the bell jar and operate the vacuum pump until the mercurial barometer reads, let us say, 6,000 ft. With stop watch ready, open the valve on the bell jar base and regulate air flow until the climb indicator hand shows a steady descent reading of 1,000 f.p.m. Maintaining this uniform rate, start the watch at the instant the mercury column of the barometer passes any convenient reference mark—let us say, 4,000 ft., and time the interval that it takes to drop from 4,000 to 2,000 ft. During this period the instrument hand must be kept steadily on the predetermined rate. If this was 1,000 f.p.m., the time interval for the 2,000-ft. drop would be two minutes for a perfect instrument. Actually, there may be a slight difference in the calculated and indicated rates. The tolerances should be obtained from the manufacturer.

Calibration of an altimeter

For "up" readings, the test equipment must be supplemented by the addition of a container in the line from the vacuum pump to the bell jar base. The lines leading to and from this must be provided with shut-off valves. The actual testing procedure is the same as before, except that the container must first be evacuated without evacuating the bell jar. The pressure in the bell jar is then reduced by opening the valve in the line from the container, and the interval timed as before.

Turn Indicators

THE heart of the turn indicator is a small air-driven gyroscope which normally revolves between 8,000 and 10,000 r.p.m. at a suction of two in. of mercury. The damping and sensitivity adjustments are made at the factory at this suction, and if trouble with the instrument is experienced, should not be altered pending the investigation of every other source of trouble.

Every hundred hours, the air intake jet on the instrument should be inspected and cleaned of any foreign matter.

There is just one place to oil,—a small hole on the right side of the instrument. Six drops of oil every 300 to 350 hr. is sufficient. Wilkins oil is recommended.

If the instrument develops trouble, the following items should be checked. See that proper suction is being obtained. This can be measured by inserting a "T" in the line *at the instrument* and connecting to a manometer, reading inches of mercury or water. As before stated, correct suction is two in. of mercury (26 in. of water). If this value is not obtained, the instrument will be sluggish. The following points should be examined.

(A) Venturi must receive an unobstructed flow of air, preferably in the slipstream.

(B) Axis of venturi must be parallel to the line of flight.

(C) Venturi and connecting line must be clean and free from dust, oil or other obstructions. Connections must be tight.

(D) Venturi must be as close to the instrument as possible. The longer the pipe line, the more friction there will be to impede the air flow.

(E) In cold weather there is the possibility of ice forming in the venturi throat. To avoid this, a location near the exhaust pipe on an extension is to be preferred.

The instrument must be mounted so that it is vertical in normal flight, with the ball in the centre of the dial. Turn indicators are tested for sensitivity by mounting them on a stand which can be rotated at known rates of speed. The instrument under test is mounted on a rack next to a master and both connected to a line having a suction of 2 in. of mercury. The rack is then turned at a known angular velocity and the hand deflection of the test instrument compared to the master.

Air Speed Indicators

THE air speed indicator is a sensitive differential pressure gauge. It indicates in terms of air speed at sea level the pressures resulting from the flow of air past the pitot-static tube to which it is connected. Connections between the pitot-static tube and the indicator are made with copper tubing of $\frac{1}{8}$ in. outside diameter. At the lowest point in each line, drain tees are installed.

An air speed indicator requires no attention except the periodic removal of the cap from each drain "T," and the

draining of any water which may have accumulated.

More air speed indicators are damaged by being blown into or sucked upon than in any other way. The pressure or suction required to secure an indication of 120 m.p.h. is only about six in. of water pressure. An ordinary person can exert a lung pressure of 80 in. of water, and can suck about twice that amount. Thirty in. of pressure applied to the pitot connection, or the same suction applied to the static connection of an air speed indicator, will damage it so as to make it unfit for use. The possibilities of damaging an air speed indicator in this way are very great, and extreme care, therefore, must be exercised.

Troubles with air speed indicators become apparent in three different ways: First, failure of the hand to return to zero. Second, incorrect speed indication—usually too low. Third, sluggish movement of the hand and failure to respond quickly to changes in speed. The source of the trouble, in any particular case, may lie in the indicator or may be due to leaks or stoppage in the connecting tubes.

Regardless of the difficulty, the first step in locating the source of trouble is to disconnect the tube lines from the indicator. If the trouble was failure of the hand to return to zero, note if the hand comes back when the connections are removed and the instrument tapped gently. If the hand comes to zero, the trouble is in the lines. If the hand does not come to zero, the trouble is in the indicator, which should be removed from the board. One of two things may be wrong: Water may have found its way into the diaphragm, or the diaphragm may have been subjected to excess pressure. Manipulate the indicator so as to let any water run out, if trapped inside. If none appears, and the hand continues to remain off zero, remove the instrument for repairs. If the instrument is of the proper range for the airplane upon which it was mounted, it cannot have been damaged by excess pressure imposed in flight. The usual cause of such damage is to be found in the misuse of this instrument by some careless person.

If the hand returns to zero upon disconnecting the lines, the trouble is undoubtedly due to water in the lines, which should be drained out.

Low readings are usually due to leaks, and sluggishness to stoppage in the lines. Test for both are easily made: First, since the instrument is now disconnected, try the indicator itself for leaks, stoppage or friction. Attach a length of rubber tube to the static (S) connection. While carefully watching the hand of the air speed indicator, suck very gently on the end of the rubber tubing until the hand reaches about one-half of the full range, then close the tube by pinching or by putting the tongue over the end. The hand should stand still or return toward zero very slowly. It should not travel over 10 mi. in the scale in a shorter time than 30 sec. If the hand moves faster than this, there is a leak in the case and the instrument should be repaired. If the movement of the hand is within this limit, the approximate rate should be noted. Now open the rubber tube, and note if the hand drops back quickly to zero. If it does not, there is a stoppage or excess friction in the indicator.

Assuming that the indicator showed no leak in excess of the limit, and that the hand dropped to zero as it should, proceed to test the tube lines for leaks and stoppage. Connect the pitot line to the static side of the indicator (where the rubber tube has been during the previous test). Slip the rubber tube over the end of the pitot tube of the pitot-static tube. Have someone watch the dial of the indicator. Suck gently on the rubber tube, having the observer stop you when half scale is reached. Close off the rubber tube and have observer note if the indicator hand moves toward zero any faster than when the instrument alone was tested.

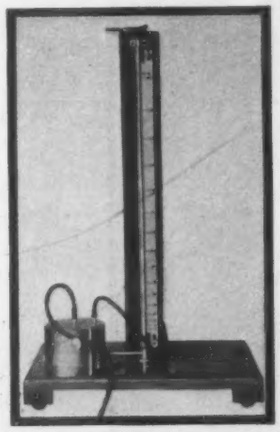
Compensating an airplane compass

If so, a leak is indicated. Leaks are almost always at joints, although split tubes are occasionally found. By breaking into the line at each joint and retesting, the leak may be located by a process of elimination.

After the line has been made tight it may be tested for stoppages. Suck on the rubber tube as in testing for leaks, until the hand reaches half-scale indication. Open the tube and note if the hand drops back to zero quickly. If not, a stoppage is indicated. This may be located by breaking into the line and retesting.

The same process of testing for leaks and stoppage may be applied to the static line.

Once an air speed indicator installation is properly made, particularly if soldered metal connections are used, it should last for the life of the airplane without any attention beyond the occasional draining of water. If trouble does develop, it may be quickly located if these directions are followed.



Manometer used for testing an air speed indicator

Compasses

AIRCRAFT compasses have often been made the subject of abuse, due largely to unfamiliarity with their inherent limitations. A compass cannot be used to hold a straight course in obscure weather unless supplemented by a turn indicator. It will not indicate correctly when the plane is banked or in a turn. This condition is inherent in any of the common card magnetic type compasses.

Every compass requires compensation after being installed in an airplane. Present-day machines employ much steel and iron in their construction, which becomes magnetized, tending to distort the earth's magnetic field. The effects of this distortion, except in extreme cases, can be overcome largely by what is known as compensation. By compensation, the effects of the disturbing magnetic field are neutralized by introducing magnetism of the opposite polarity in like amount. As each airplane (even of precisely similar type) may be magnetized in a different amount, individual compensation is absolutely necessary before the compass can be relied upon.

Vibration and other factors encountered in service also have the effect of changing the magnetic properties of the plane, necessitating recompensation every three months or thereabouts.

The procedure is as follows: Determine directions by means of a pelorus or a surveyor's transit. Place the airplane in flying position and head due North (magnetic). If the compass does not read N, turn N-S compensator screw (with non-magnetic screw driver) till compass does read N. Head the plane due East (magnetic). If the compass does not read E, turn E-W compensator screw till compass does read E. Head the plane due South (magnetic). If compass does not read S, turn N-S compensator screw to remove half the error. Next head the plane West and remove one-half the error as at South. Now head the plane successively 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330 and 360 deg., noting the compass reading for each heading on the correction card, which should be fixed near the compass. Do not attempt to remove errors greater than 30 deg. by compensating. If the errors to begin with are greater than this, a new location should be found for the compass.

Compasses must always be kept completely filled with liquid. Where the quantity is small, clear kerosene can be used to replace any liquid lost. Never use alcohol in a modern aircraft compass.

Sluggishness of a compass may be due to weakness of the magnets or to friction. With the steel now in use, loss of magnetism is very rare. Friction may be due to a dull pivot, a cracked or broken jewel or to contact of some part of the rotating element to some fixed part of the compass.

The period or swinging time of the compass card is a good indication of its condition. To measure the period of a compass, remove the compensator or compensating magnets, place the compass on a table and note its reading. With another magnet, pull the card around to a heading 45 deg. away from the correct reading. After holding in this position for a few seconds to allow the liquid to settle, withdraw the magnet rapidly, starting a stop watch at the same time. The time should be taken from release until the correct graduation passes the lubber line and compared with a table of periods from 45 deg. deflection, which can be obtained from the compass manufacturer.

A compass which exceeds the maximum allowable time should be serviced for some defect which exists, causing the sluggishness. As a further test, the card may be deflected 3 to 5 deg. to either side and its action noted. Friction will prevent the card from returning to its proper position.

It is very important that the field strength in the room in which the compass is to be checked is determined. This is done by taking a compass into a good magnetic location (parks, fields, etc.) and determining its period in this location. A correction should be worked out for the difference in period in the location having correct field strength, and in the test room. This is quite important, as appreciable differences in periods have been found in various rooms in the same building.

If no friction is apparent, either in the form of a cracked jewel or in actual mechanical contact at some point other than the pivot, and the trouble still exists, the compass should be returned to the factory for repair.

A Word of Caution

THERE is no substitute for experience in the servicing of aircraft instruments. The few suggestions made here can in no measure hope to make it possible for an amateur to take over the responsibility of keeping an airlines' instruments in condition. If they have served only to bring to the attention of the operator the extent of the subject of instrument maintenance, then the purpose has been accomplished.

A word of caution should be added. Aircraft instruments are fine mechanisms. It is practically a universal rule among the makers that if they are taken apart, all guarantees are void. Any service work on the part of the operator must, therefore, be undertaken only by personnel capable of restoring the instrument to proper condition.

THE AIRLINE ATTENDANT'S JOB

By C. B. Allen

ONE who has flown on any considerable number of American airlines, or, for that matter, on those of Europe, cannot fail to have been impressed by the great divergence of practice and want of anything approaching standardization as regards cabin attendants on large airplanes. Probably this is the most unsettled and least-agreed-upon phase of the air transportation of passengers, a subject still very much in its experimental stages as a whole.

First of all, is an attendant of some sort aboard a plane in flight necessary to the comfort and welfare of the passengers? If the answer to this question is in the affirmative, what type of person is best suited to the job? Finally, and most important of all, just what service should such an attendant render and at what point do his ministrations begin to be an annoyance instead of an assistance to those who receive them?

Pan American Airways has stuck consistently to the cabin boy type of aerial attendant — alert, good-looking youngsters — carefully trained in regular and emergency duties.

Economic necessity temporarily has answered all these questions at a single stroke on several of our domestic airlines by doing away with the flight attendant altogether. This move followed the sweeping fare reductions put into effect on many American airlines about a year ago in an attempt to build up the volume of passenger travel by air to a point where it eventually would be more remunerative to the operator than the old situation of high prices and few passengers. It was looked upon as inevitable in the general scheme of retrenchment to reduce the crew of the airplane to a minimum, thereby not only lowering the overhead but increasing the passenger capacity of each ship. The air-travelling public would have to shift for itself.

As a matter of fact, in several respects, this worked no hardship whatever, for a great many airline patrons much prefer being severely let alone while flying to receiving constant attention from a glorified and frequently over-zealous aerial deck steward. More than one disgruntled air traveler has expressed his annoyance, either subsequently or at the time, concerning the well-meant enthusiasm of an airplane attendant who insisted on shaking his "fare" out of a comfortable doze to point out relatively obscure and unimportant landmarks along the line of flight. Then again, there have been instances of airplane attendants, one of whose duties is to minister to occasional victims of airsickness, being so overcome by rough going that they had to be looked out for by tender-hearted passengers, while by their own example they inspired internal dismay among others of their charges who were not such good sailors.

Consequently, it is not surprising that there has been much difference of opinion as to the desirability of airplane attendants. Airline operators don't seem able to agree even on what they shall call such employees where it has been decided to use them. Directors' meetings have been called over no weightier problem than whether a given line should have its passengers looked out for by "aerial couriers," by "flight companions," by "airplane attendants," by "cabin boys," or by mere "stewards" who would have to content themselves with the reflected glory of an aeronautical-looking uniform. Last spring the Boeing system introduced a daring innovation on its day-and-night route from the Great Lakes to the Golden Gate by selecting young women for its staff of airplane attendants and calling them by the prosaic but practical and sufficient name of "stewardesses."

So far this experiment seems to have worked very well indeed; far more satisfactory, in fact, than on the average airline that has tried out cabin attendants. This is by no means solely due to the fact that the girls chosen were attractive and that attractive girls usually are an asset in any endeavor. For the Boeing line chose graduate nurses of proved capability to cater to the wants of those who ride across the Rockies in the company's great twelve and eighteen-passenger tri-motors. and the reason for picking nurses was not with a view to their availability in possible accidents but because nurses are trained to discipline and accustomed to looking after the comfort of others. Besides, their experience enables them to tell how much attention a passenger really needs and how much he imagines he needs; also

how to give that attention calmly and efficiently as well as how to humor aerial hypochondriacs away from their imaginary woes. Nurses know how to handle the public with a certain finesse that is indispensable when dealing with a group, most of whom have suddenly been transplanted from solid ground to a strange medium which they instinctively fear and distrust despite their determination to be modern and air-minded.

For several months Eastern Air Transport has been using hostesses, as it designates them, on its New York-Washington section with great satisfaction. Five are now employed but more will be taken on when larger planes are installed on the southern sections of the line.

This company is making a special bid for women passenegers and hostesses answer the average woman's desire for the company of another woman on a flight. There has been a definite increase in the volume of patronage by women since the hostess system was inaugurated.

Young women who have had some aviation experience are preferred. Two of the present staff are amateur pilots. Each girl is flown over the line for three weeks as a passenger to familiarize her with chief aspects of the operation and her job before being given the official blue uniform and assigned to a plane. She is expected to be able to identify interesting landmarks along the route, report the plane's speed and altitude when such information is requested and serve light refreshments.

ONE airline, that does considerable over-water flying and consequently insists on rigidly disciplined and thoroughly trained cabin attendants, occasionally has put these employees to a severe but practical test after drilling them in their duties regarding life preservers, air rafts, general conduct in an emergency, etc. While cruising far out from shore with a plane-load of such candidates for permanent berths as aerial cabin boys, an engine suddenly coughs and dies, the ship goes into a glide toward the sea and a tense-faced co-pilot bursts back into the cabin to announce that all hands are about to come down in the water. The thing is so realistically done and flying so new an experience to the neophytes that no one suspects a trick and the real reaction of the various boys to a sudden emergency is thus obtained. It is a tribute to the previous tests of selection and elimination that no attendant has yet lost his head in this test, though plenty of them have lost a little color.

Pan American Airways has stuck consistently to the cabin boy type of aerial attendant, insisting on alert and good-looking youngsters who are carefully trained in the regular duties expected of them and just what they are to do in an emergency. This company's planes carry a crew of four; cabin boy, pilot and co-pilot and radio man, and the attendant is considered so essential to its service that it has refused to dispense with him in the face of definitely limited loads for over-water operation with land machines. On its Sikorsky amphibion Miami-Nassau run it has gone in for cabin boys of the jockey-bell hop weight and type but this is the only concession that has been made to its general rule on the score of crew.

On the New England and Western Airways, which operated during the past summer from New York to Albany, Springfield, Boston, Hartford and other seaboard cities, negro Pullman porters were used as cabin attendants with very good results. The porters, once they overcame their nervousness about flying, were tremendously proud of their jobs and, of course, had the necessary training and background to render the right sort of service. From the novice passenger's point of view the experiment was very reassuring, for it supplied the familiar atmosphere of the Pullman car and made flying seem a lot less strange.

European airlines sometimes have a cabin attendant and sometimes do not. Ordinarily they seem to consider the co-pilot and radio operator capable of coping with whatever wants may arise among the passengers and let it go at that. On the Imperial Airways de luxe tri-engined service between London and Paris a special cabin attendant has been provided, but the necessity for his presence was noted immediately after the ship took the air. For one of his first acts was to open a compact kitchenette-like bar and begin serving drinks to the thirsty. And that, of course, is no job for a pilot!

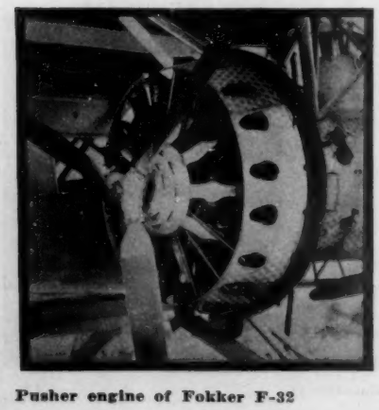
Boeing's innovation of stewardesses has proven extremely satisfactory

Transport and Engineering

THE USE OF THE RING COWLING ON PUSHER ENGINES

THE use of cowlings of the N.A.C.A. or Townend type on radial air-cooled engines driving tractor propellers has been well established, and there is no lack of published test data to indicate the improvement in performance to be gained by their application. Although airplane designs incorporating pusher propellers are in a decided minority at the moment, several interesting applications of cowlings to pusher engines have been made recently, and the results obtained have indicated that some benefit results. The data available so far are derived from the experience of several individual designers, but it is to be hoped that some systematic wind tunnel investigation can be made in the near future which will serve as a reliable guide for future installations.

One of the most positive indications of improvement resulting from the application of a ring cowling to a pusher engine has been reported from an installation made on one of the Fokker F-32 airplanes operated by the Aero Corporation of California. Aft of the exhaust collector ring, a sheet metal cowl surrounds the cylinder heads. It tapers to a diameter less than the overall engine diameter, and the rocker boxes project to the outside through openings in the sheet. Inside the cowl deflectors are installed to direct the air over the back of the cylinder heads. It has been reported that back pressures were very materially reduced and the cylinder head temperatures dropped approximately 100 deg. In addition, the installation of these cowls was reported to have increased the top speed approximately 10 mi. per hr., and to have lengthened the time between overhauls on the pusher engines from approximately 200 to about 300 hr.

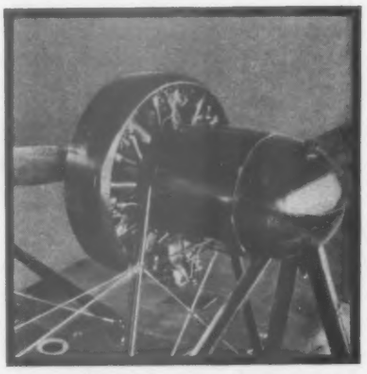


Pusher engine of Fokker F-32

Ring cowling for pusher types have also appeared recently on the "Privateer" built by Amphibians, Inc., and on the new Loening monoplane flying boat designed for submarine service with the U. S. Navy. Pilots who have flown the Privateer before and after the installation of the cowling have reported that although there is no great difference in maximum speed apparent, there has been a decided improvement in elevator and rudder control. This is undoubtedly due to smoother airflow over these surfaces.

The cooling is apparently very little affected by the addition of the ring as no difficulties have been reported in maintaining normal engine temperatures. There has been some indication that the size and setting of the propeller have been affected, but the available data is inadequate as a basis for the formulation of any rules.

The ring installation on the Loening flying boat is very similar to the one employed on the Privateer. This machine was test flown with the ring in place, but there is no data available at the moment to indicate its effect on the performance.



Ring cowling on "Privateer"

It is not to be expected that the aerodynamic effects of the cowling on pusher engines will be as great as those obtained with engines and propellers of the tractor type, but there is suficient evidence at hand to indicate that a properly designed cowling installation is worthy of consideration, and that future experimental work in this direction is justified.

OPERATING AN AIRPORT HOTEL AT A PROFIT

POSSIBILITIES for profits in the operation of airport hotels are clearly shown by the experience of the management of the Airport Inn, successfully maintained at Oakland Municipal Airport, Cal., since July 15, 1929. This hotel was established by the Interstate Company at a time when many airport hotel projects were being discussed. To date it is the only genuine hotel operated on any first-class American airport.

The Airport Inn was erected by the city of Oakland, operators of the Oakland Municipal Airport, at a cost of $55,000 and was leased to the Interstate Co., which invested an additional $29,000 in equipment and furnishings for the hotel and dining room. Of fireproof, modern construction throughout, the two-story hotel building contains 37 guest rooms and lobby, with the dining room adjoining. Location of the building is adjacent to the airport administration building and depot, facing the flying field. The airport is about six and a half miles south of the city of Oakland and across San Francisco Bay from the city of San Francisco. The ground transportation facilities connecting Oakland Airport with the major metropolitan centers of the San Francisco Bay area are relatively poor and it was thought that this condition would encourage air travelers to stay at the airport overnight.

Under the original scheme of operation it was planned to make the Airport Inn the first of a chain of airport hotels which would cater to air travelers primarily, and also to airport personnel and to some extent to local townspeople. The response from patrons of the airlines was most disappointing, however, on top of which two of the air transport

lines, using the port when the hotel was opened, shifted their operations to other fields. This situation left the hotel almost completely devoid of patrons after a year of operation.

At this time Mr. W. B. Shields, the present manager, was brought in to make an analysis of the problem. As a result of this analysis it was decided to concentrate on making the hotel a "home" for the airport personnel, including employees, pilots, and flying students; to make a strong appeal to local townspeople, especially for restaurant trade; and to devote but slight attention to the transient air passenger. Under this policy the patronage has been built up until it has been at an average for the past six months of more than 60 per cent of capacity, and the hotel is definitely on a paying basis.

The results of this experience gained by the management of the Airport Inn clearly indicate that the air transport passenger is not a likely customer for airport hotels, at least for the present. The reason is that the vast majority of air travelers are in a hurry to reach some destination other than the airport.

Under the plan now in effect at the Airport Inn special rates for rooms and meals are offered to flying students taking instruction at the airport. Students are permanent guests at the hotel throughout their training period, two occupying each room. This makes it possible for the hotel to realize a profit even on the basis of student rates. Students arrange for meals in the hotel dining room on a flat monthly basis which permits them to order anything on the menu three times a day. Although this rate is very low the hotel is able to offer it because of the large and regular volume of meals served under this plan, eliminating waste. Another factor is that many students spend their evenings in town, or spend their week ends at home, thus considerably reducing the number of meals per month served each student. Similar low rates are offered to other field employees and pilots, a number of whom live in the hotel. This direct field business has made it possible, in conjunction with careful planning, to maintain the hotel on a profitable basis.

Another important item has been the large volume of business obtained from local townspeople. Due to the unique location of the hotel, and the attraction of such a project as a large municipal airport, it has been possible to arrange a great number of special parties, luncheons, afternoon teas, and evening dinners given by various clubs and organizations of Oakland and surrounding towns. This has been accomplished without in any way turning the hotel into a road house or night club. The municipal authorities of Oakland have been most strict in the enforcement of rules under which the hotel is permitted to operate, neither public nor private dances being permitted in the hotel or its dining room. A substantial number of local people patronize the hotel as week end guests, treating the visit as an "outing," and an opportunity to break away from conventional surroundings and to study aircraft operations without sacrificing convenience or comfort. This trade has proved to be a substantial item of income and is being built up steadily.

Air passenger transients make regular use of the hotel in small numbers and for their convenience at least one and normally two rooms are always held open.

A typical guest room at Airport Inn

The results of this experiment by the Interstate Company in airport hotel operation over a considerable period of time, clearly indicate that the airport hotel has real profit possibilities, but not through catering to air passengers. If organized to serve airport employees and students primarily, and neighboring townspeople in every way possible, airport hotels should prove profitable on a number of our larger and more active airports.

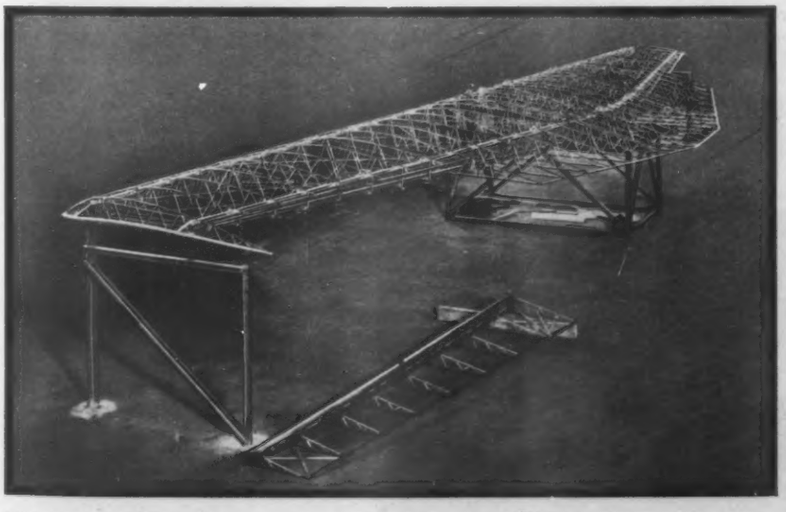
SPOT WELDED ALL STEEL WING CONSTRUCTION

CONSIDERABLE interest is in evidence at the present time in the possibilities offered by stainless steel for aircraft construction, and a number of manufacturers are conducting experimental work in this direction. Among them Fleetwings, Inc. of Roosevelt Field, Long Island, has been specializing particularly in wing design. Their wing ribs have been on the market for some time, and very recently they have completed the construction of their first all steel wing.

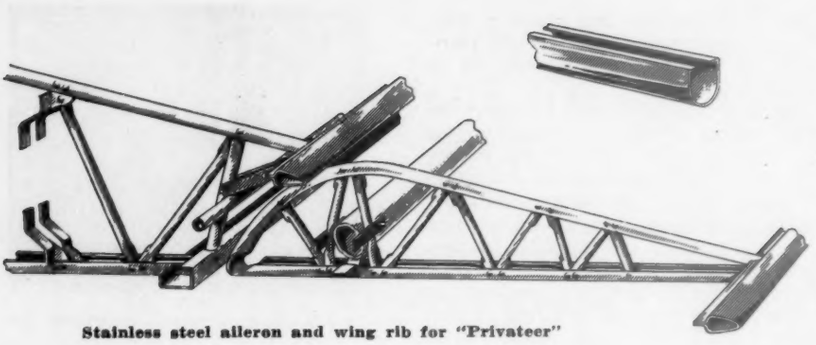
Ribs for wings, ailerons, elevators, etc., are built up of individual tubular or modified channel section, fastened together by spot welding. Stainless steel strip, cold rolled to very high tensile strength is slit to suitable widths and the various sections are formed by drawing through suitable dies and rolls on a draw bench.

The individual rib members are then cut to the required length and ends prepared for assembly by means of a specially designed press and dies. All the parts for a rib assembly are clamped into a jig and all joints are completed by electric spot welding. An example of this type of construction is shown in the accompanying sketch. The assembly illustrated is an aileron rib and the rear portion of a wing rib, for the "Privateer," built by Amphibions, Inc., of Roosevelt Field, Long Island. The method of finishing the trailing edges of both wing and aileron is clearly shown, as well as the method for attachment of the wing rib to the rear spar and the aileron rib to the torque tube. The chord members of these assemblies are of the section illustrated in the upper right hand corner of the sketch, and the truss members are circular in section.

Before the Department of Commerce issued their approval on the spot welded rib, they specified that they should be



All steel monoplane wing



Stainless steel aileron and wing rib for "Privateer"

tested by loading the rib to 50 per cent of its design load and simultaneously vibrating the spar points through an amplitude of 1/32 in. for 10 hr. Under the required loading, 1150 vibrations a minute at 1/32 in. amplitude were applied for 50 hr. At the completion of this test, the ribs were given a static load test and it was reported that the full design load was successfully held.

Full details are not yet available on the structure of the all-steel wing. It has been reported, however, that it is of full cantilever type, tapered both in plan and section, and weighing 2.1 lb. per sq.ft., complete with all fittings, and fabric covering. Ribs are of the construction described above, and the beams are built up from stainless steel sheets, spot welded throughout.

Flying Equipment

THE DOUGLAS "DOLPHIN"

IN the "Dolphin," the Douglas Aircraft Company of Santa Monica, Cal., offers for the first time in its history an airplane designed primarily for commercial use. The machine is a twin-engined amphibion monoplane designed to fill the requirements of the private owner, but also readily adaptable for use on commercial airlines and for certain requirements of the Army, Navy or Coast Guard.

The single tapered wing is of full cantilever construction and is mounted directly above a central hull. The power plants, which consist of two Wright 300-hp. engines, are carried in nacelles above the wing hung well forward of the leading edge. The tail surfaces are carried by the stern of the hull, the fin being an integral part of the latter, and the horizontal stabilizer is carried by the fin well above the water line. Its only external bracing is a pair of tubular struts running upward from the stern post to the rear stabilizer spar.

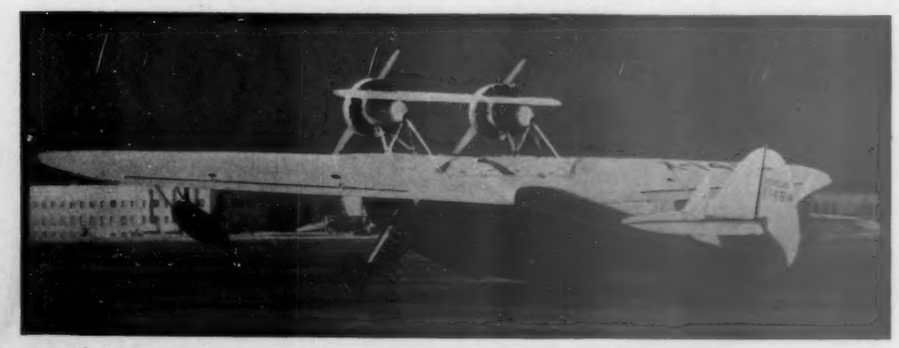
One of the most unusual features of the design is the small auxiliary airfoil across the top of the two engine nacelles whose primary purpose is to smooth out the airflow in the vicinity of the power plant. It is of full cantilever all wood construction and arranged so that it can be readily removed when necessary. Its total area is 48 sq.ft. It is claimed that the addition of this auxiliary airfoil resulted in slightly lower landing speeds and an increase of 2 m.p.h. in top speed. In the experimental plane two small auxiliary vertical fins were mounted on the horizontal stabilizer, but it is reported that the additional vertical area will be incorporated in the main fin on future models.

The retractable landing gear has a tread of 12 ft. and is hydraulically operated. Steel tube axles and drag struts are enclosed in a common fairing and the main load struts extend to the forward wing-fuselage fittings. In the retracted position, the wheels and axles are above the water line, but are not withdrawn from the air stream. Hydraulic brakes are standard equipment. The tail skid, which incorporates a hydraulic shock absorber unit, is hinged to the hull bottom just forward of the rear step and carries a large contact shoe with a hardened surface. Wing-tip floats provide stability on the water.

The hull is built entirely of duralumin flat sheet and open channel sections. Rigid truss framing is used from the landing gear fittings to the tail skid, but fore and aft of these points the hull is of true monocoque construction. All members are bolted or riveted. Six watertight bulkheads divided the hull laterally into seven individual compartments connected by special water-tight doors. Access to the hull is gained through two hatchways, one forward of the pilot's cockpit and one just aft of the trailing edge of the wing.

The main wing is built in one panel, tapered in plan form and thickness, and is entirely of wood construction. Spars are of the box type with spruce cap strips and plywood side plates, and ribs are of plywood in truss form. The wing is covered with three-ply spruce. Auxiliary welded steel tube bracing is incorporated in the wing structure at the points where the engine and cells are mounted. Two 90-gal. fuel tanks are

The Curtiss-Wright "Coupe"



The Douglas "Dolphin"

mounted within the wing on each side of the center section.

Cabin arrangement and decorations can be varied to suit the individual purchaser. A maximum of six chairs can be installed, making the total carrying capacity of the airplane eight persons. The machine is completed bonded for radio installation, and all instrument board and cabin lights are standard. A full set of engine and navigation instruments is provided.

The general specifications as furnished by the manufacturer are:

Length over-all	42 ft. 6 in.
Height over-all	14 ft. 7 in.
Span	60 ft. 0 in.
Wing chord at root	132 in.
Wing chord at tip	84 in.
Wing area (excl. auxiliary)	550 sq.ft.
Auxiliary wing	48 sq.ft.
Weight empty	5,605 lb.
Total gross load	8,000 lb.
Wing loading	15.5 lb. per sq.ft.
Power loading	13.3 lb. per sq.ft.

CURTISS-WRIGHT "COUPÉ"

THE possibilities of mono-spar construction for airplane wings have been discussed rather widely both in the United States and abroad. With increasing interest in all metal designs, the single-spar wing offers sufficient advantage so that it will probably be more seriously considered among manufacturers in the future. Several successful applications have been made in this country, the latest of which is in the case of the new Coupé recently announced by Curtiss-Wright.

The Curtiss-Wright "Sport Trainer"

The spars are of welded chrome molybdenum steel tubing built up in the form of a trussed girder extending from the leading edge to the center-of-pressure point. Stresses are carried from the ribs to the girder and thence to the fuselage through special fittings, and through tubular streamline struts extending inward from approximately the mid-point of the wing to the top point of the fuselage. Center of pressure travel is limited by the selection of a wing section having convex lower camber.

The machine is a low wing monoplane, powered with a Wright Gypsy 90 hp. engine, with a cabin (designed to seat two persons), which, due to its location with respect to the wing, offers unusually good visibility for both pilot and passenger. Side-by-side seating is provided with storage space for baggage available behind the seats. Dual controls are fitted.

The landing gear incorporates both oleo struts and low presure semi-balloon wheels, and a castering tail wheel is provided. Wheel brakes are operated from the rudder pedals but may be fully disconnected, or completely locked by operating a pull handle on the instrument panel.

Aside from the wing beam construction, which will be described in more detail in a subsequent issue, the arrangement and material used are conventional. The fuselage is of welded chrome molybdenum steel tubing and the tail group is fabricated from a combination of spruce, duralumin and alloy steel tubing. The entire structure is covered with doped fabric. The general specifications as furnished by the manufacturer are as follows:

Length	25 ft.
Height	8 ft.
Span	38 ft.
Wing area	188 sq.ft.
Weight empty	1,136 lb.
Gross weight	1,747 lb.
Wing loading	9.29 lb. per sq.ft.
Power loading	19.4 lb. per hp.

CURTISS-WRIGHT "SPORT TRAINER"

ONE of the most important considerations for the school operator, or the private owner in the selection of an airplane is economy in maintenance and repair. In training operations and in sport flying, damage to wing panels necessitating replacement of ribs or fittings is not uncommon. In order to keep this item of expense at a minimum, the greatest possible standardization of parts has been sought in designing the wing structure of the new Curtiss-Wright Travel Air Sport Trainer. Beams, ribs, and fittings are all interchangeable, not only with similar parts of the Sport Trainer, but also with many corresponding parts of the Sportsman, another of the new Curtiss-Wright airplanes.

The machine is a tractor biplane of conventional design, powered with a four-cylinder Wright Gypsy engine of 90 hp. It will also accommodate either a 110 hp. Warner engine or the 125 hp. Kinner model. The wing cellule has equal chords and spans, slight positive dihedral, and marked positive stagger. Current design practice has been followed in the construction. Fuselage and tail surfaces are built of welded chrome-molybdenum steel tubing. Wing beams are solid rectangular spruce and ribs are laminated spruce of the truss type. Fuselage, wing and tail surfaces are fabric covered, and aluminum alloy sheets protect the leading edges.

The Buhl "Bull Pup"

The manufacturer's specifications:

Length	21 ft. 5 in.
Height	8 ft. 10 in.
Span	28 ft. 10 in.
Wing area	206.4 sq.ft.
Weight empty	1,075 lb.
Gross weight	1,725 lb.
Wing loading	8.15 lb. per sq.ft.
Power loading	17.72 lb. per hp.

THE BUHL "BULL PUP"

AN interesting new light airplane to be formally introduced at the Detroit Aircraft Show has been announced by the Buhl Aircraft Company of Marysville, Mich. The machine, which has been christened the "Flying Bull Pup," is a mid-wing single-place monoplane, powered with a 45 hp. Szekely engine. It is to be offered in several models, all of which will have fuselage, landing gear, and tail surfaces in common, and

varying only in wing span, thus permitting the buyer to select the speed range best suited to his requirements.

The most unusual feature of the construction of the machine is the all-metal, duralumin fuselage of monocoque design built in three sections, any of which may be replaced by a new unit in the event of damage. It is planned to market replacement units on a price basis comparable to that of ordinary automobile repairs. The fin is an integral part of the rear fuselage unit.

Wings are of conventional wood construction with fabric cover. They are wire-brased externally to a tripod cabane structure forward of the cockpit, and to the underpart of the fuselage at the point of attachment of the rear landing gear struts. The landing gear is a combination of oleo and shock cord, and may be fitted with skiis or pontoons, as well as wheels. All tail surfaces, with the exception of the fin, are of steel tube construction with fabric cover.

tion which is built as an integral part of the fuselage and forms two short metal covered stubs to which the wings are attached. Special members within the stubs transfer the wing stresses to the fuselage, and eliminate the necessity of carrying the main wing beams through the cabin as is the case with the usual construction. Heavy structural members over the cockpit are thus elminated, and it is then possible to roof over this area with large glass panels which afford unobstructed vision to pilot and passenger upward and to the rear.

Aside from the center section, the construction of the machine follows conventional lines. The fuselage is of welded steel tubing and is covered to a point aft of the cabin with sheet aluminum. The balance of the fuselage, as well as all wing and tail surfaces, are fabric covered. Wing spars are built up of spruce and mahogany plywood and ribs are of spruce with plywood reinforcement. The leading edges are covered with sheet aluminum, and steel compression struts and square tie rods are used for internal bracing. Ailerons are hung on ball bearings and are operated by torque tubes concealed within the wing. Attachment of wing tips to the center section stub is by means of special steel fittings which permit attachment and alignment of the wings is a relatively short period. Fuel tanks are mounted in the wing stubs.

The machine is offered in two models, Standard and DeLuxe. The latter differs from the Standard in that full starting equipment, navigation and landing lights, metal propeller, heater and extra instruments are provided. The manufacturer's specifications are:

Span	34 ft. 4 in.
Length overall	25 ft. 0 in.
Height	7 ft. 7 in.
Wing Area	180 sq.ft.
Weight empty (Standard)	1,325 lb.
Weight empty (Deluxe)	1,400 lb.
Useful load (Standard)	725 lb.
Useful load (Deluxe)	650 lb.
Maximum power loading	18.65 lb. per hp.

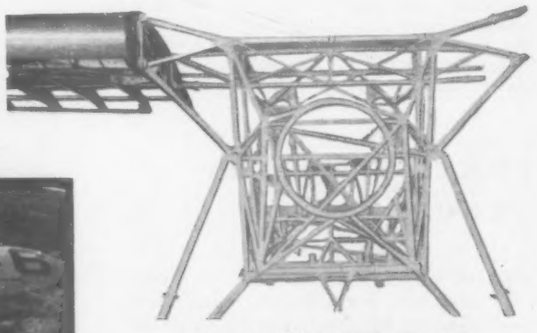
THE SWANSON COUPE

PROBABLY one of the most undesirable characteristics a high wing monoplane of conventional type is the presence of an extensive blind area upward and to the rear from the normal cockpit position. This condition is especially bad in turns when full vision in that particular field is essential for safety. The Swanson Aircraft Company, Inc., of Hopewell, Va., has recently placed on the market an airplane whose wing construction has been considerably modified by the consideration of this particular problem.

The Swanson Coupe is a single engined, high-wing monoplane designed for side-by-side seating for two persons. It is intended primarily for the private owner, or for schools giving instruction in cabin types. The machine is unusually clean aerodynamically as the wings are of the full cantilever type and are free from external bracings. The principal departure from conventional constructions occurs at the center sec-

THE CONTINENTAL A-40 ENGINE

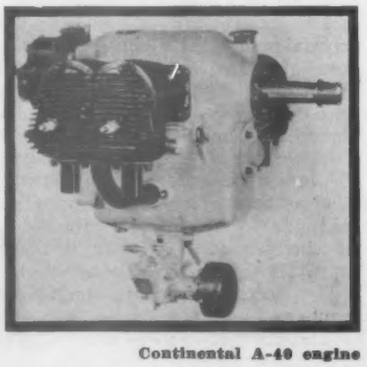
WITH the introduction of the model A-40 engine, the Continental Aircraft Engine Company, Detroit, Mich., has entered the light aircraft field. The engine is a four cylinder, horizontal opposed, air-cooled, L-head, four-cycle design, developing 35 hp. at 2500 r.p.m., designed around the requirements of the private plane owner. The horizontal opposed arrangement of the two pairs of cylinders makes for simplicity of cowling arrangement, and affords practically unobstructed vision from a cockpit behind the engine. The total weight is 138 lb.



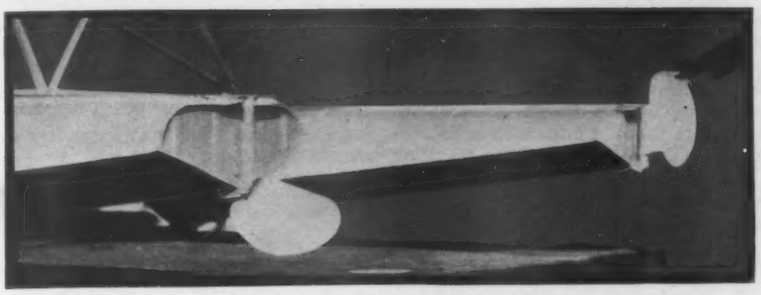
Above: Attachment of wing to fuselage on Swanson Coupe. Left: The Swanson Coupe

All component parts of the assembly are mounted on or contained in, a heavily ribbed, one-piece, heat-treated aluminum alloy crankcase. Four engine supporting lugs are cast integral with the rear of the case, and the oil reservoir is located in the bottom. A heat-treated aluminum alloy cover which carries the magneto and tachometer drive is bolted to the rear end of the case. A single carburetor is attached directly to the bottom of the crankcase. The riser from the carburetor goes up through the oil reservoir, and branches right and left inside the case, connecting with the external intake pipe to the cylinder at flanged connections located near the bottom on each side.

The cylinders are nickel iron cast in pairs, and suitably finned for cooling.



Continental A-40 engine



Water rudders installed on Edo floats

The heads are heat-treated aluminum alloy cast in pairs, and the pistons are heat-treated aluminum alloy die castings. Three compression and one oil control ring are provided above the wrist pin. The latter is secured in place by the use of snap rings. Connecting rods are high carbon steel forgings.

The crankshaft is a one-piece, three-throw, high carbon steel forging, heat-treated and completely machined. Integral counter weights are provided. The shaft is drilled throughout for lightness and is plugged to form an oil passage. The shaft is supported in two bronze backed babbitt-lined bearing design to take thrust in both directions. The camshaft is a carbon steel forging.

The cylinders are of the L-head type and are each provided with one intake and one exhaust valve. The latter are of chrome steel and are operated by adjustable round nose steel tappets.

Lubricating oil is circulated by a vane-type oil pump driven by the camshaft, and located on the front of the crankcase. Full pressure lubrication is supplied to the main bearings and the crank pins. The camshaft bearings are lubricated through drilled passages in the crankcase. Cylinder walls and piston pins are oiled by spray from the crankcase. Pressure release valves and oil pressure gauge connections are provided. The normal oil pressure at 2500 r.p.m. is 35 lbs. Additional specifications of the manufacturer are:

Bore .....3¾ in. (79.4 millimeters)
Stroke .....3¾ in. (95.2 millimeters)
Piston displacement....28.7 cu.in. per cyl.
Total piston displacement.....114.8 cu.in.

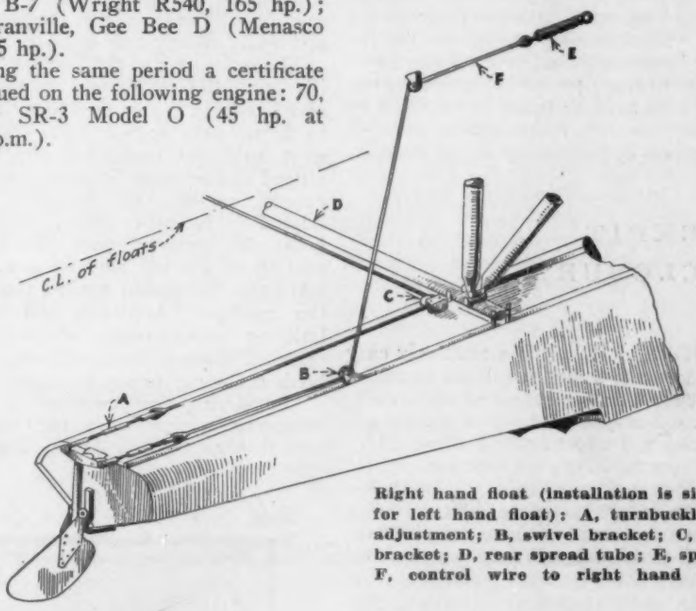
APPROVED TYPE CERTIFICATES

DURING the period Jan. 17 to March 7, 1931, the Aeronautics Branch of the Department of Commerce issued the following Group I approved type certificates: 391, Bellanca Air Bus P-200 (Cyclone R182 OE, 575 hp.); 392, Viking, Kitty Hawk B-8 (Kinner B-5, 125 hp.); 393, Waco MNF (Menasco Pirate C-4, 125 hp.); 394, Spartan C4-301 (Wasp Jr., 300 hp.); 395, Keystone, Air Yacht K-85 (Cyclone, 525 hp.); 396, Aeronautical C3 (Aeronca E107A, 28 hp.); 397, Curtiss-Wright, Curtiss-Wright Junior CR-1 (Szekely SR-3, Model D, 45 hp.); 398, Granville, Gee Bee E (Warner Scarab, 110 hp.); 399, Swallow HC (Comet A70, 165 hp.); 400, Emsco, B-3A (Wasp, 420 hp.); 401, Curtiss-Wright, Travel Air 12-Q (Wright Gipsy L320, 90 hp.); 402, Stearman 6D (Wasp Jr., 300 hp.); 403, Emsco B-7 (Wright R540, 165 hp.); 404, Granville, Gee Bee D (Menasco C-4, 125 hp.).

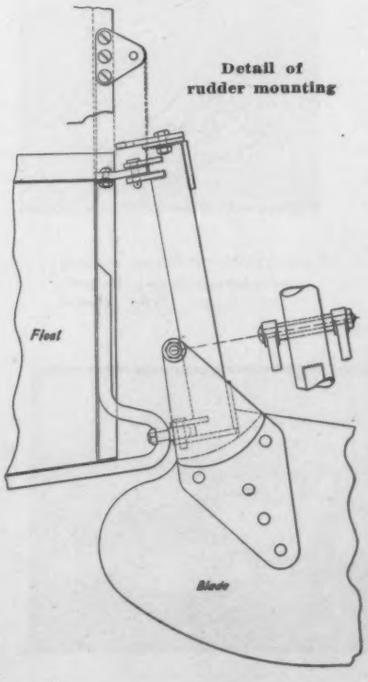
During the same period a certificate was issued on the following engine: 70, Szekely SR-3 Model O (45 hp. at 1750 r.p.m.).

RUDDERS FOR SEAPLANE FLOATS

OF the causes which retarded the development of the seaplane as a private vehicle, one which is frequently overlooked, and generally under-rated, is the difficulty of handling a machine of this type on the water at low speeds. Many pilots have little trouble in taking off, flying, or landing, but when it comes to maneuvering on the water in any but a very light breeze, the machine has a tendency to take charge, sometimes resulting in damage to itself or other craft. The difficulty, of course, arises from the almost total loss of air-rudder control at relatively slow speeds, and the natural tendency of the airplane to "weather-cock" into the wind. Ordinarily, where winds exceed velocities of 10 or 15 m.p.h., it requires a very nice combination of throttle and rudder control to maneuver a seaplane satisfactorily.



Right hand float (installation is similar for left hand float): A, turnbuckle for adjustment; B, swivel bracket; C, rigid bracket; D, rear spread tube; E, spring; F, control wire to right hand pedal



Detail of rudder mounting

The Edo Aircraft Corporation of College Point, N. Y., have designed and put on the market, water rudder equipment which can be applied to all floats of their design. A balanced duralumin rudder blade is hung on a tubular steel rudder post bracketed to the square transom of the float. Through a special forked fitting, the blade is pivoted to the post at a point about at the normal water line. Ordinarily, the weight of the blade keeps it hanging in a position well below the keel where it may work at maximum efficiency under the turbulent water in the rear of the float. The entire blade is free to swing upward to the rear, so that in case any floating obstacle is encountered, the blade simply swings out of the way and cannot be damaged. The contours of the blade are so laid out that the rudder will also swing in case the floats are backed into a ramp of the usual slope. When moving at

high speed on the surface the water pressure is sufficient to swing the blade up out of the way so that there is little additional resistance at takeoff or landing speed.

The control arrangement is extremely simple. The rudders of the two floats are interconnected by a balancing cable, and cables are run from each outside tiller arm up to the rudder pedals of the airplane, at which point they are connected to the usual steering system through spiral steel springs which insure against failure of air-rudder control in the event the water rudders become jammed or damaged for any reason.

These auxiliary rudders are available for all types and sizes of Edo floats and add from 7 to 12 lb. to the total weight of the normal installation. The attachment can be made in a relatively short time without special tools, and without drilling any holes into the body of the float. Maneuvering the plane on the water becomes almost as simple as steering the average power boat, and no unusual care need be taken in beaching or docking, as the rudders take care of themselves by folding up out of the way.

COCKPIT ENCLOSURE

ORDINARILY it is a relatively easy matter to assign airplanes to one of the general classifications of open cockpit, or cabin type. The use of cockpit enclosures of the sort recently designed by Fleet Aircraft, Inc., for mounting on its regular two-place models, will make this division somewhat more difficult, however, as the same airplane may be converted from one type to another on relatively short notice. Aside from the obvious improvement in pilot and passenger comfort in winter weather, a detachable enclosure of this character is of great advantage to school operators who wish to offer both open cockpit and cabin instruction without greatly increasing their equipment inventory.

The cockpit housing as designed for the Fleet can be fitted to the airplane with no changes other than the removal of the standard cockpit cowling, padding and wind shields. In cross section the housing is of a modified inverted U shape. At the forward end the several panes of glass slope up from the top cowling line to a well rounded metal cap piece, and aft of the rear bulkhead a generous fairing carries the cabin line smoothly down to the turtle-deck. The streamlining of the design is excellent, and the fact that the enclosure adds 2 to 3 m.p.h. to the top speed of the machine in spite of greatly increasing the fuselage cross-sectional area indicates the extent of the loss due to drag of the normal cockpit and windshield combination.

The entire assembly is substantially built, and when mounted on the machine has little of the appearance of a temporary or detachable structure. All metal parts are of duralumin substantially fastened together with rivets and bolts, and the glass is of the non-shatterable type. The windshield and the roof panels are permanently fastened in the frames, but the side panels are arranged in felt grooves so that they can be opened by sliding fore and aft.

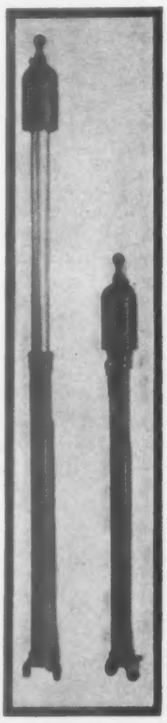
The main part of the housing extending from the windshield frame to the rear bulkhead is arranged to swing open to permit easy access to the seats. On each side the main side frames are hinged to the upper longeron, and each carries one-half of the roof section hinged to its upper edge. Either, or both side sections with the attached portion of the top may be swung outward and downward against the side of the fuselage. A simple and effective latching arrangement, which can be operated from either inside or outside holds the cover firmly in place.

Considering the completeness of the enclosure, vision from both seats is remarkably good. Aside from one blind spot,—upward and to the rear from the rear seat—very little of the normal field of vision is obstructed. The space inside the cabin fairing behind the rear bulkhead is utilized as an additional baggage space. Access to it is gained through a "zipper" in the rear seat head rest.

Above: A Fleet cockpit enclosure open. Below: the same type closed

RETRACTABLE LANDING GEAR STRUT

DEVELOPED to the specifications of the Douglas Aircraft Company for use on the new "Dolphin" amphibion a hydraulic retractable landing gear strut and shock absorbing unit of simple design has recently been offered by the Gruss Air Spring Company of America, Ltd., for general amphibion use. The unit consists of a standard Gruss Air Spring, model B-84, of 5½ in. dia. and 4½ in. stroke, combined with a hydraulically actuated telescoping strut. Total weight of each strut unit is 69 lb., and its length is 69½ in. retracted and 100½ in. extended. There is an overlap of 10½ in. between the inner and outer tubes of the strut when in the extended position, and a total movement of 31½ in.



Retractable Strut

Operation of the hydraulic strut is by means of a hand operated pump mounted in the pilot's cockpit working in conjunction with a two way valve and a 5-gal. reserve tank. Each strut requires the movement of about one quart of oil for retraction and one gallon for extension. Struts are retracted by about a minute of hand pumping. Extension is almost completely automatic.

Each strut is designed to withstand a static load of 11,000 lb., has an energy absorption of 30,000 in.lb., and will withstand a maximum compression load of 41,580 lb. in landing, or a hydraulic pressure of approximately 5,000 lb. per sq.in. All struts are designed to carry brake torque bending loads in addition to column and compression loads.

What Our Readers Say

Pilot Life Insurance

TO THE EDITOR:

In your February issue you have on page 117 an article "Flying Versus Life Insurance" which is probably intended to be humorous, but certainly does not give an accurate view of the attitude of life insurance companies. The writer of the article should get in touch with a reliable agent, submit to him all the important facts, and leave him to deal with the case in a proper way whether the applicant is subject to an extra charge or not.

It must surely be admitted that aviators incur unusual hazards to life. We have specialized in aviation hazards for several years, and know. For example—it is a fact that fatal accidents to pilots run to about 30 per 1,000 per annum on the average. Some types of pilots run a still greater hazard, some less. In the case of passengers, the mortality rate per flight averages about 1 in 5,000. Life insurance companies are guided by statistics, when reliable figures are available; now the companies allow five or six *passenger* flights in a year without extra premium and without any discrimination.

A man who is in the aviation industry, however, especially a man who has been a pilot (or at any time may become a pilot) cannot expect to get life insurance on the same terms as an average healthy man who does not incur any extra liability, or who flies rarely as a passenger.

It is natural for those in the aviation industry to look upon the hazard as slight. After all, there are 970 pilots out of a thousand who survive each year without a fatal accident; each pilot thinks, of course, that he will be one of the 970. But this does not alter the fact that from the life insurance company's standpoint there are 30 per 1,000 killed and the life insurance company must therefore charge not less than, but *a little more than, $30.00 per thousand* to cover the flying hazard in the case of pilots.

There is another very important fact which life insurance companies have always to keep in mind:—If they issue a policy to a young man in the aviation industry without restriction, he may afterwards assume much more hazardous duties (such as piloting planes) and the insurance company cannot then impose an extra premium. In other words, they have to take all precautions when the policy is first being issued. Companies have already suffered from deaths by aviation and some of them may on this account be a little timid in accepting unknown risks. It should be very clear to any thoughtful man, however, that life insurance companies must, in the light of statistics now available, charge extra premiums, and move slowly; also that they owe a greater duty to the average body of policyholders than they do to any aviator who, with some lack of frankness, may appear to be endeavoring to get standard insurance without paying that extra premium which his occupation properly demands.

Mutual life insurance is conducted in a spirit of fair play as between one group of policyholders and another. The claims are all paid by the policyholders; the officers and directors have only the duty of seeing that the charges between the various groups are just and fair. A good sport, whether in aviation or in submarine duty, will pay the extra premium which his occupation requires and will not try by concealment to get the better of the other policyholders in his company.

HENRY MOIR
President
United States Life Insurance Company.

The Conduct of Races

TO THE EDITOR:

Referring to your article "Afterthoughts on the Races" in the October issue of AVIATION, I wish to take the opportunity to call to your attention certain features in the handling of the Miami All-American Air Races which in many ways corrected situations which you criticised at Chicago.

The public address system at Miami was an excellent installation, the information being disseminated from a microphone located either at the press stand in the control tower or at the timer's stand in the same tower at the will of the announcer. The announcing, handled the larger part of the time by Carl Voelter, of the Curtiss-Wright Flying Service, kept at all times in step with what was going on. No assumption was made that the public understood the various manouvres, terms used in describing them and the types of ships in the air, but rather the announcer resorted to what might seem to the initiated a primary description. Boring as this may have been to be professional aeronautic man in attendance, to the public it was enlightening. No effort was spared to keep the group interested and informed.

Prior to the start of any race a list of entries was distributed from the ditto machine in the timer's stand to the officials, the press and the announcer, the latter informing the public just prior to the start of the races as to the entrants, the pilots and the types of ships. During the race his announcements were confined to the event, and as a rule before the fourth or fifth man had rounded the pylon on the first lap, the time and speed for the first plane were announced, followed in rapid succession by the times and speeds of the other contestants. This same procedure held for each of the laps, and less than 60 seconds after the first contestant crossed the finish line his time and speed were made available to the announcer by the timer and sent out over the public address system. This same intense announcing held for all the racing events and within ten minutes after the field judges had turned in the results of the other contests, such as the parachute dropping, the balloon bursting, the bomb dropping and dead-stick landing, result sheets were made available to the press and to the announcer.

Specialists were also employed for such features as the autogiro flights and similar exhibits requiring a closer knowledge of the event at hand than the regular announcer might be expected to have.

The timing system under the direction of Carl Schory functioned with precision, an accurate record showing that in many instances race results were in the hands of the announcer 23 seconds after the entrant crossed the finished line. Official copies of race results were within a very few minutes then made available to the press and to the race officials.

Reviewing the microphone installation, it is my opinion that future meets should provide a microphone in or near the timer's stand, in the control tower with the regular announcer located thereat. If it is considered advisable that a field microphone be provided for the introduction of famous persons to the crowd, such a microphone should be supplemental to the main installation in the timer's stand, and controlled by the announcer therein rather than have the announcer so located as to be accessible to everybody.

One thing lacking in Miami which should be a part of every control system is the provision for direct telephonic communication between the timer's stand, the referee and the contest hut, and the director of the races.

Strange as it may seem, the public took greatly to what you refer to as the gymkhana element. This was particularly emphasized at the finish of the amphibian race wherein the contestants were required to fly to Biscayne Bay, catch a fish, return with it on the hook, the first man delivering the fish to the announcer being adjudged the winner. The sight of Art Caperton and Geo. Meissner dragging a pole, line and fish out of their cockpits and racing to the control tower stood the crowd up amidst considerable cheering. Similarly, in the unofficial racing on the following day when the contestants in this race went out to Miami Beach and returned with a bathing beauty, a lot of interest was exhibited, but not as much as in the other fish.

There seems to be still much to be

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desired regarding the difference between the number of entrants and the number actually starting the race. While in practically all cases very accurate information was supplied to the timer's stand and from there disseminated as described above regarding the entrants for each event, it was found that in practically all of the closed course races except one only about 50 per cent of the entrants actually lined up for the start of the race. Some procedure seems to be necessary through a cash forfeit or otherwise for assuring the start by all entrants except those who, through permission of the Contest Committee by virtue of extenuating circumstances, are excused from the races. It seems highly undesirable to have a large number of entry blanks filled out unless the contestants actually intend to start the races, particularly in view of the early distribution to the press and to the public through the public address system of the list of entries, only to find it later cut in half.

The racehorse starts appeared to be very satisfactory and certainly made the closed course events extremely interesting owing to the relatively close grouping about the pylons and on the main stretch.

While I believe that considerable still remains to be done to make the race events even more interesting to the public, I believe that the handling of the Miami races in a large measure meets many of your criticisms.

A. J. UNDERWOOD
Director of Aeronautic Activities
Society of Automotive Engineers

New Volumes for the Shelves

COMMERCIAL AND NAVAL FLYING

THE SKY'S THE LIMIT, *By Lieut. D. W. Tomlinson; Macrae Smith Co.; 289 pp.; $3.50.*

THIS is a curious book. It should have been written in two distinct parts. Midway of its length the author, whose autobiography it is, does a right-about-face with a violence that makes him look like a dual personality. While telling of his adventures in the Navy in which he learned to fly—in which he attained the fame that created a commercial demand for his services—in which he was serving when he led the Three Sea Hawks along their path of glory at the National Air Races of 1928—he has hardly a good word for any officer of high rank, and still less praise for discipline or for the idea of obedience to regulation. With the chapter that marks his passage into commercial life, as manager of operations for Maddux Air Lines, he suddenly blossoms out as a veritable martinet, insistent upon instant respect for authority.

On page 47, telling how he borrowed an airplane from the Army: "Had I ever soloed a DH? [The Army operations officer asked.] They had nothing available but DH's. Of course I'd soloed DH's. Hundreds of times, I averred. (I'd never even *sat* in one of the accursed coffins.)"

On page 228, after the change of career: "It should be a cardinal principle in directing and managing air operations that a pilot need violate orders but once, or display poor judgment or take unnecessary risks but once, to lose his job. The pilot who in any way shows the slightest indication of * * * lack of respect for his company's policies or disloyalty to his superiors must be discharged immediately."

The attitude that Lieut. Tomlinson shows after leaving the Navy is fortunately characteristic of the men who are running air transport. That which he records himself as having maintained while in the service is very happily not in the least characteristic of naval aviators.

For 200 pages he pursues the Navy with merciless and unexplained vindictiveness. Even General Mitchell can hardly use the word "Admiral" as an epithet with greater effect. Unfortunately, this violent prejudice against the high command leads him to make some notably inaccurate contributions to the history of naval aviation. He offers the astounding information, for instance, that Admiral Reeves, who had taken command of the Battle Fleet's Aircraft Squadrons in 1926 and had been a constant and enthusiastic advocate of a larger dependence on airplanes and aircraft carriers in naval operations, "became 'air-minded' overnight" in 1928 as a result of watching Lieut. Tomlinson and two fellow-officers give a stunting exhibition.

The book attributes to "the Admirals" the idea that dive bombing could be applied to heavy bombs. The writer of this review happens to have been in a peculiarly favorable position for watching naval developments at that time, and speaks from his own positive knowledge in saying that that suggestion was urged independently by at least one naval aviator of long experience and by a civilian official concerned almost exclusively with aeronautical matters. Lieut. Tomlinson tosses it lightly aside as though it were a completely idiotic notion. As a matter of fact, it is of course perfectly practicable, and the one structural failure that the author mentions has nothing to do with the case. Structural failure has occurred in all sorts of military airplanes, fighting, bombing, and observation. That is one defect that we can always be absolutely sure of obviating. A plane can always be made strong enough for any conditions, as soon as we know definitely what they are.

Not only in views on discipline, but in literary style, the author is divided against himself. The naval portion is marked by a forced flippancy aggravating in the extreme, with almost every aviator habitually referred to by his nickname, or sometimes a couple of nicknames at once for good measure. The latter, or commercial section is a mixture of such purely personal material as the log of a honeymoon flight and of exceedingly sober and matter-of-fact treatment of a small number of technical problems, particularly engine overhaul and blind flying.

Few men have had a more varied experience than Lieut. Tomlinson, who was sandwiching gypsy flying into his naval career before there was any such thing as commercial air transport in this country. Few have won more deserved admiration for their aerial skill. It is a great pity that that combination has not produced a better book.—EDWARD P. WARNER, *editor of* AVIATION.

TWO VOLUMES ON GLIDERS

THE BOOK OF GLIDERS, *by Edwin W. Teale; E. P. Dutton and Company, New York 1930; $2.50.*

MR. TEALE has accomplished what is practically a 400-page book on gliding and has been able to maintain a high level of interest. He is consistently non-technical, there is not a formula or a graph from cover to cover, and yet there is much information of use to a serious student of the art.

The chapters on how to build, launch and fly a glider are all right, although the first mentioned has the queer fault of needing more overall drawings rather than details of fittings. The chief merit of the book results from the mass of material gathered on the history of gliding; famous special flights, to altitude across country and for endurance; and in the descriptions of such sites of gliding and soaring activities as Kitty Hawk, Cape Cod, Point Loma, Biskra (Africa), Rossitten, the Wasserkuppe, etc.

Even the collection of personal histories of famous soaring pilots is interesting, although the listing of each one's nickname is a little too much for

my own personal consumption. For instance the knowledge that William Hawley Bowlus is called "Hawley" by his intimates rather than "Bill" or even "Bowl" is not going to improve my gliding technique, I could never get used to Lindbergh as "Slim," and as for "Thundering Maxie" Kegel, "Espie" Espenlaub, and "Peaches" Wallace, I would certainly rather see than be one.

•

GLIDERS AND GLIDING, *by Ralph Stanton Barnaby; The Ronald Press, New York, 1930; $3.00.*

ALTHOUGH on the same subject, and though both are of distinct value there is surprisingly little repetition of subject matter in this book and the one reviewed above. My advice is to buy both of them.

Lieut. Barnaby's book should be the cornerstone, or at least the point of departure, for the advanced flying technique, we have been taught by the Germans to expect from gliding and soaring activities.

The principles of airfoil characteristics are included and should be within the grasp of any high school junior or senior. The advice on flying and general activities is particularly sound and there is a generous debunking of extravagant claims for backyard power gliders, and a forecast that, unless gliding can lead to soaring, flights on the level or from gentle slopes are bound to pall on youthful enthusiasm.

In his chapters on design and construction there are many excellent photographs and drawings of details and general features of a number of types of soarers as well as of the training glider. Although no attempt is made of complete instructions for any one of them.

The discussion of dynamic as well as static soaring, and a chapter on the gliding diagram may cause some of the lay members some mental difficulties, but might possibly start a little scientific effort on the subject.

My only regret is that the book could not have been a hundred pages or so longer.—DANIEL SAYRE, *assistant editor of* AVIATION.

ALUMINUM AIRCRAFT HANDBOOK

ALUMINUM IN AIRCRAFT; *Aluminum Company of America, Pittsburgh, Pa., 1930; 153 pages; price 50c.*

OF late, the Aluminum Company of America has made it a practice to publish individual booklets covering certain phases of the uses and applications of aluminum and aluminum alloys to various industrial processes. These booklets are intended to be more than mere advertising bulletins covering the specific products of the company, as each constitutes a text book in which basic principles are laid down for general use. A new publication of this type has recently been received which is of direct interest to the aircraft industry.

"Aluminum in Aircraft" is on a much more ambitious scale than many of the previously issued industrial bulletins of the company. It is obvious that considerable time and effort have been expended in its preparation. The subject matter covers a wide range of topics all bearing directly on the uses of aluminum in the aircraft industry. The metallurgy and physical properties of the various alloys and forms of aluminum are fully covered and a great many specific applications of the material are thoroughly described. Considerable attention is given to the technique of the various manufacturing operations, such as heat-treating, welding, riveting, machining, etc.

Probably the most important consideration in the use of aluminum alloys in aircraft is corrosion and means for protection. These important subjects are treated at length and the results of extended researches are summarized in a series of practical notes which should be of great interest to any one called upon to design any structure of aluminum where corrosion is likely to be a factor.

The book is attractively bound with a decorative heavy paper cover. It is well printed and copiously illustrated with pertinent diagrams and photographs. In order to keep it out of the hands of the habitual catalog collector, it is being distributed at a nominal price, but it is well worth the small cost to anyone who is interested in or has anything to do with design, maintenance or operation of aircraft.—S PAUL JOHNSTON, *assistant editor of* AVIATION.

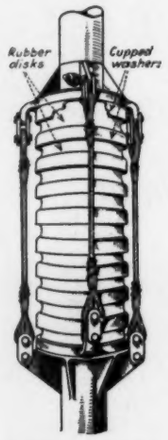
Getting the Time-Clock Habit

NOW YOUNG MAN, JUST FORGET YOU WERE EVER CAPTAIN OF THE FOOTBALL TEAM, AND I THINK THERE WILL BE A GOOD OPPORTUNITY FOR YOU HERE.
YES SIR
OH, LARRY!
EXTRAVAGANCE
U. S. BUSINESS
COMMERCIAL AVIATION

Servicing Short Cuts

LONGER LIFE FOR SHOCK ABSORBERS

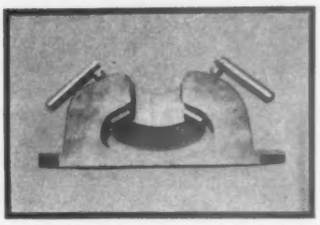
FAILURE commonly occurs in the rubber rings in compression types of shock absorbers by a splitting of the ring due to the material squeezing outward between the usual flat plate separators. The National Air Transport Company has more than doubled the effective life of the disks by replacing the flat washers with shallow cups whose edges tend to restrain the outward flow of the rubber. The cups are cheap, and easily obtained, and can be mounted in place of the washers without changes of any sort. Clearance is provided, both in diameter and in length of cup lip to take care of the normal deformation of the rubber rings under load.



Compression-type shock absorber assembly showing cup washers in place

A CONNECTING ROD ASSEMBLY VISE

CONSIDERABLE time and effort is saved in assembling connecting rods for radial engines in the shops of the Aero Corporation of California by the use of a special vise. The difficulties ordinarily encountered in supporting a radial engine crankshaft in an ordinary vise without marring the surfaces are entirely eliminated, and the parts are held firmly in a convenient position for assembling the master and connecting rod assembly.



Vise which supports a crank shaft without marring its surfaces

The vise is a special casting of simple design recessed to receive the crankshaft and counter balance of a radial engine. Adjustable clamps hold the counter weight firmly in position, and make possible the use of this device for a number of crankshafts of varying dimensions.

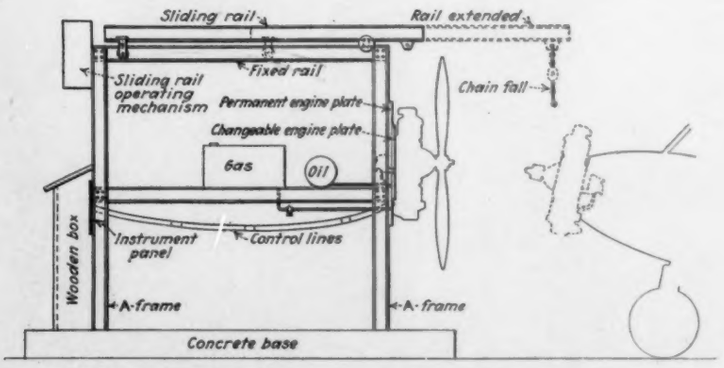
AN ENGINE RUN-IN STAND

SEVERAL hours' time are saved in the installation of overhauled engines in airplanes at Roosevelt Field, Inc., by the use of a special run-in stand. This equipment is located in the open air adjacent to the repair shop. It consists of a pair of heavy structural steel "A" frames set on a concrete foundation tied together with suitable structural steel cross-bracing. The upper structural member forms a track on top of which an "I" beam is supported on rollers which can be moved longitudinally by a screw jack operated from the rear of the stand. At its free end, the movable beam carries an eye from which a chain fall can be suspended. A heavy plate is bolted across the front "A" frame to support the engine, and an instrument and control panel enclosed in a weatherproof box is attached to the rear frame. Gasoline and oil tanks are mounted on the cross bracing.

Engines coming from the repair shop are hoisted into place directly from the over-hauling stand by means of the chain fall and hoisting arm of the test stand. An adapter plate for each make of engine permits the testing of all radial types without changes in the main mounting plate of the stand. With the engine bolted in place, the hoisting arm is fully retracted, a calibrated test propeller is mounted, and the engine instrument and controls are connected to the panel. All control rods and wires are connected exactly as called for by the design of the airplane into which the engine is to be fitted.

At the end of the run-in period, the fuselage into which the engine is to be installed is moved on its own wheels to a point opposite the run-in stand. The height of the engine above the ground is approximately the same as that for the mounting ring of the airplane. The test propeller is dismounted and all controls and feed lines uncoupled. The chain fall and sling are remounted on the end of the hoisting arm and are used to support the engine while the mounting bolts are removed. By operating the screw jack, the sliding head is moved forward so that the engine swings away from the mounting plate, and, as soon as the clearance is sufficient, the former is turned around and the fuselage is moved into place behind it. By means of the chain fall, the engine bolt holes are aligned with the mounting ring and the bolts are put in place. All wires, control rods and feed lines are already of the proper length and can be connected quickly. The fuselage is then

Measuring cylinder compression



General arrangement of run-in stand and hoisting equipment

returned to the hangar on its own wheels for final assembly and the need for rehandling the engine to the shop independently is entirely eliminated.

TESTING ENGINE COMPRESSION

DETERMINING the exact time at which an engine should be subjected to major overhaul has been simplified by the service department of the western division of Transcontinental and Western Air, Inc., through the practice of making a compression chart of the engine at 200 hr. of flying time and periodically thereafter until overhaul.

Cylinder compression is determined by screwing a pressure gauge into the front spark plug bushing of each cylinder individually and then turning that cylinder past the compression point by hand. The needle of the gauge used remains at the maximum pressure indicated until released permitting accurate recording. In order to insure uniformity it is necessary for the same mechanic to make any given series of readings on an engine, as the reading taken by different individuals may vary due to variations in the technique of turning the cylinder past the compression point.

Technical Abstracts

BRACING STRUTS FOR MONOPLANES

INTERFERENCE EFFECTS AND DRAG OF STRUTS ON A MONOPLANE WING; *by Kenneth E. Ward, N.A.C.A., Technical Note No. 365.*

VERY little data are available on the drag effects of inclined bracing struts commonly used in semi-cantilever monoplane wing construction. A recent report published by the National Advisory Committee for Aeronautics on this subject is more or less preliminary, but it is indicative of results to be expected from a combination of this sort and points out that further experimental work is justified.

The investigation consisted in the measurement of the aerodynamic characteristics of a 5x30 in. standard wind tunnel model of the Gottingen 387 section at approximately full Reynolds Number in the variable density wind tunnel. A pair of tandem struts of Navy No. 1 Section with a fineness ratio of 5 were arranged so that they could be mounted either on the upper or lower surface of the airfoil, extending outward from the plane of symmetry and intersecting the airfoil at an angle of 20 deg. The axes of the struts were in a plane perpendicular to the chord plane of the airfoil and parallel to the leading edge, and the chords of the strut section were parallel to the chords of the airfoil section. This approximated standard conditions for conventional low- or high-wing monoplane.

The report includes the full tabulated data resulting from the tests and also polar diagrams showing lift versus drag for various combinations of wing and struts. Moments about the 25 per cent chord point are also given. The conclusions which were reached as the result of this investigation are as follows:

1. The interference drag of struts attached to a wing may be as great as the drag of the struts alone.
2. Struts attached to the lower surface have less effect upon the airfoil characteristics than struts placed upon the upper surface.
3. The interference effects are sufficiently large to justify further investigation.

CUTTING OFF OF PROPELLER TIPS

FULL SCALE WIND TUNNEL TESTS OF A PROPELLER WITH THE DIAMETER CHANGED BY CUTTING OFF THE BLADE TIPS, *by Donald H. Wood; N.A.C.A. Technical Report No. 351.*

A FEW years ago it was common practice to adapt propellers to airplanes by simply cutting off the tips until the engine turned at the desired r.p.m. Even since adjustable pitch metal propellers have come into general use it is sometimes found desirable to make adjustments in this manner. This report describes an investigation made at the N.A.C.A. to determine how the characteristics of a propeller are changed by cutting off the tips.

The propeller used in the tests had adjustable aluminum alloy blades. The initial diameter was 10 ft., this being reduced 6 in. at a time to a final diameter of 8 ft. After each reduction the tips were rounded off with a circular arc tangent to the leading and trailing edges. The upper surface was then rounded off for about ½ in. in the larger diameter and 1 in. as the diameter became less and the thickness greater. Each diameter propeller was tested at pitch settings of 12, 17, 23, and 28 deg. at 0.75 of the radius.

The propeller was mounted on a D-12 425 hp. engine installed in an open cockpit fuselage on the balance of the propeller research tunnel.

The results were given in terms of the thrust and power coefficients, $\left(C_T = \frac{\text{effective thrust}}{\rho n^2 D^4}\right.$ and $C_P = \frac{\text{input power}}{\rho n^3 D^5}$ where n = revolutions per unit time and D is the propeller diameter$\left.\right)$ and propulsive efficiency $\left(\frac{\text{useful power}}{\text{input power}} = \frac{\text{effective thrust} \times \text{velocity of advance}}{\text{input power}}\right)$ The propulsive efficiency and $\frac{V}{nD}$ were plotted against the speed-power coefficient, $C_S = \sqrt[5]{\frac{\rho V^5}{P n^2}}$, where V is the velocity of advance and P represents the power absorbed by the propeller. Propellers operating at the same value of C_S are operating under like conditions of power, velocity, and revolutions, and can be fairly compared.

There were three variables—body interference, plan form, and thickness—entering into the problem and it was impossible to attribute the changes in charactistics to any one of the three. However, since tests had previously been made with the diameter as the only variable, it was found possible to make an approximation as how much of the change was due to change in the relative diameter of propeller and body only.

Each decrease of diameter caused a corresponding drop in maximum efficiency, the 20 per cent change in diameter from 10 ft. to 8 ft. resulting in a drop in maximum efficiency of about 6 per cent. Of this amount approximately 2½ per cent was accredited to increase of body interference caused by the relatively large body, and the remaining 3 per cent to change of plan form and thickness.

As might be expected from an increase of blade width near the tip and thickness near the hub, large increases of thrust coefficients and power coefficients were noted. At the $\frac{V}{nD}$ for maximum efficiency the thrust coefficient was 51 per cent higher for the 8-ft. diameter than for the 10-ft. diameter. Likewise the power coefficient was 60 per cent higher. At the lowest pitch setting (12 deg.) C_T was 33 per cent higher and C_P was 56 per cent higher.

Thus the loss in efficiency due to cutting off the tips of a propeller is small, and it was concluded that the practice was justified by the tests.

The report includes diagrams designed to simplify the selection of the proper propeller for a given engine power, revolutions and forward velocity.

The Buyers' Log Book

AIR COMPRESSOR

AN AIR compressor especially adapted for paint spray work and other miscellaneous aeronautical uses, is offered by the Ingersoll-Rand Company in its portable electric-driven compressor, Type 30. It is similar to the corresponding fixed units offered by this company save that it is mounted on roller bearing casters and is furnished with a length of electric cable.

The Type 30 is furnished in six sizes from ¾ to 5 hp. with air receivers varying from 35 to 80 gal. All sizes are designed for continuous working pressures up to 200 lb. The compressor unit in all cases is of a two-stage type and represents the product of extensive experience in this field of design. Fixed units are also available deriving their power from a gasoline engine.—AVIATION, *April, 1931.*

IGNITION SHIELDING

COMPLETE ignition shielding for all types of aircraft engines is being manufactured by the Breeze Corporations, Inc., of 24-46 South 6th Street, Newark, N. J. The equipment is divided into three parts (1) the main shielding, which includes the entire ignition system from the magnetos up to the spark plugs; (2) the auxiliary shielding, which includes all ignition wires from the magneto to the booster magneto and switch; (3) the shielding for the spark plugs (optional). The main shielding is supplied completely wired in a combination of rigid and flexible conduit which replaces the ordinary open ignition system without changes of any sort to the engine. Shielding designed to tie in with the main system is available for all common makes of spark plugs. — AVIATION, *April, 1931.*

GASKETS

A PRODUCT known as the Steelbestos gasket composed of asbestos reinforced with steel has been developed by the Detroit Gasket and Manufacturing Company, Detroit, Mich. High heat and pressure resistance and the ability to adapt itself to surface variation under compression are some of the outstanding claims for this new gasket.

The backbone of the gasket is a steel sheet which is stamped by a process which produces protruding tongues and cup-shaped depressions on both sides. Two sheets of asbestos which have been rendered impervious to gasoline and water are forced down over the tongues and into the depressions under high pressure.

The final shape of the gasket is cut out after these operations, enabling the manufacturer to greatly simplify his dies, and thereby offer an exceptionally prompt service on any specialized orders.—AVIATION, *April, 1931.*

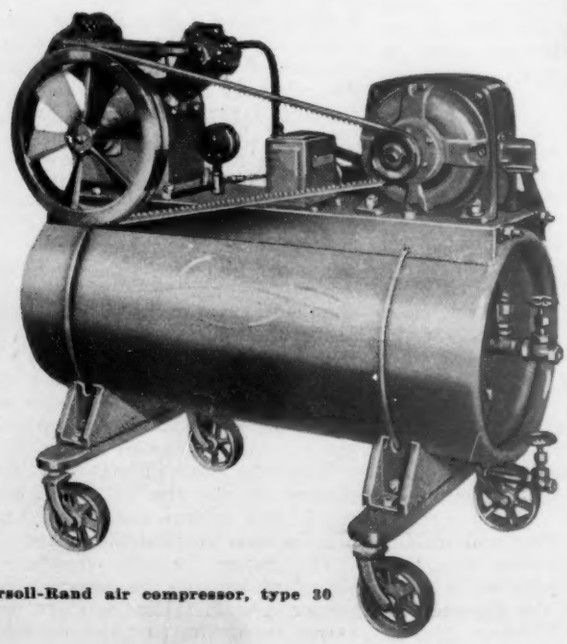
OBSTRUCTION LIGHT

THE Flexlume Corporation of Buffalo, N. Y.. have perfected a neon obstruction light which they are now offering to the industry. Although it can be mounted on any type of obstruction it is especially adapted to mounting on high tension lines where it can be powered from the line itself through suspension type capacitor units thus eliminating any need for transformers, arresters, switches, etc. An automatic cutout is furnished on all lights and operates whenever one or more tubes fail leaving the remaining tubes burning as before. — AVIATION, *April, 1931.*

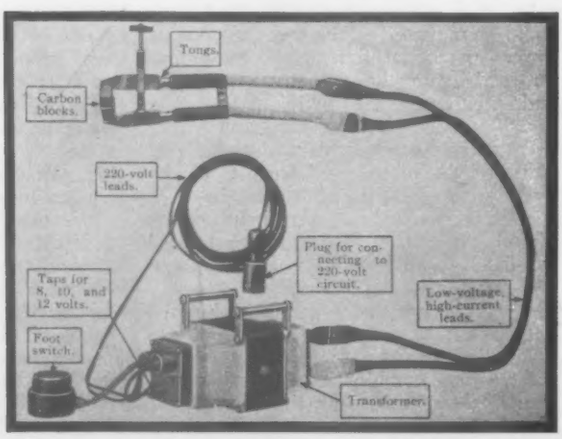
BRAZING EQUIPMENT

A PIECE of equipment which should be of interest to shops called upon to make brazed or hard soldered joints in brass, copper, bronze or steel, in repair or production work is being marketed by the General Electric Company. Heat is generated by passing an electric current through a pair of carbon blocks forming the faces of a pair of special tongs, which hold the parts to be joined clamped between them. The equipment is fully portable and may be moved about the shop to any convenient location. It is furnished complete with transformer, leads, foot-switch and tongs. The standard brazing transformer is of 10 kva. capacity, weighs 95 lb. and is wound with a 220-volt primary arranged with taps so that 8, 10 or 12 volts can be obtained from the secondary.—AVIATION, *April, 1931.*

Breeze spark-plug shield



Ingersoll-Rand air compressor, type 30



Complete General Electric 10-kw. brazing equipment

Frisbie Magnetic Compass

MAGNETIC COMPASS

THE Frisbie Aircraft Products Company of 401 Chapel Street, New Haven, Conn., has placed on the market a new magnetic compass for instrument board mounting. The casing forming the bowl and expansion chamber is of cast aluminum, and an aluminum card is suspended on a sapphire cup. The single magnet is of cobalt steel and the compass is filled with mineral oil. Adaptable compensating magnets are built in. The instrument complete weighs 1 lb. 4 oz.—AVIATION, *April, 1931.*

TACHOMETERS

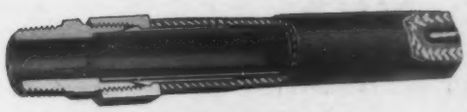
ALTHOUGH mechanically-driven tachometers of a high degree of accuracy and reliability may be readily obtained, there are certain applications where motors are located more or less remotely with respect to the instrument board, to which the electric tachometer is particularly adapted. The equipment now offered by the Weston Electrical Instrument Corporation of Newark, N. J., consists of a magneto unit equipped with standard S.A.E. connections at the engine, and a small volt meter calibrated in engine r.p.m. to be mounted on the instrument board. Two types of indicator are offered, one with a round dial similar in appearance to standard pressure gages, and the other of a fan type designed along the lines of larger switchboard electrical instruments.—AVIATION, *April, 1931.*

SAFETY TREADS

NEW non-skid floor covering has been announced by the Melflex Products Company of Akron, Ohio. This material which is built up of cotton cords embedded in a vulcanized rubber compound is available in mats of varying sizes and shapes, can be used on stair treads, walkways, aisles, shop floors, etc. Its weight as given by the manufacturer, is approximately 2¼ lb. per sq.ft.—AVIATION, *April, 1931.*

COMPOSITE TUBING

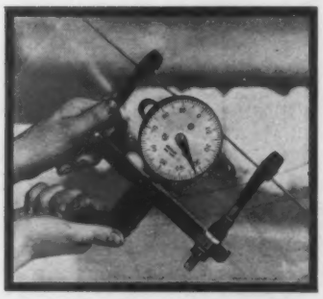
TUBING designed to reduce the possibility of fuel and oil line leakage has been announced by the Sky Specialties Corporation of Detroit, Mich. Ordinary small diameter copper or aluminum tubing is used, completely enclosed in a skin of vulcanized gas- and oil-proof fabricated rubber, reinforced with fabric. In case a crack or a break occurs in the metal tube during flight, the rubber cover prevents any leakage, and the presence of the break is indicated to the inspectors by the formation of a small lump in the rubber casing. Specially designed couplings are provided at each end of a length of the composite tubing.—AVIATION, *April, 1931.*



Special end fitting for Sky Specialties rubber-covered tubing

SHUNT DYNAMOMETER

IT IS common practice to rig the tie rods of an airplane by "feel," but it has been demonstrated that the practice is usually inaccurate, and results in tensions which may vary as much as

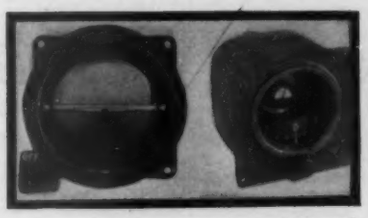


Chatillon Shunt Dynamometer

35 per cent. John Chatillon & Sons of 89 Cliff Street, New York, N. Y., has placed on the market an instrument known as a Shunt Dynamometer or Tensiometer, designed for the direct measurements of tension in airplane tie rods. The instrument is hung over the rod, clamped by means of a hand lever, and the actual tension in the wire is indicated directly on the dial.—AVIATION, *April, 1931.*

TWO INSTRUMENTS

FOR safety in flying it is essential that some line of reference be available to the pilot by which the attitude of the airplane may be controlled. Normally the natural horizon serves for this purpose, but when it is obscured for any reason some other criterion must be found as it has been well established that the physical senses of the pilot are totally unreliable under such conditions. The Sperry Horizon has been designed to give the pilot the necessary line of reference regardless of the conditions of visibility outside the cockpit. The instrument is compact and simple in appearance. It is circular in shape and carries a bar across the face representing the true horizon. Fastened to the outer case is the outline of a small airplane which represents the machine in which it is installed. In flight the small plane is kept in proper relation to the bar exactly as though the natural horizon were being observed. A gyroscope, driven by air from a small Venturi tube of standard design, actuates the horizon card. The instrument itself weighs 4½ lb., and the Venturi and connecting tubing weigh also 4½ lb., making the total weight of the installation 9 lb.



The Sperry Horizon, left, and the Sperry Directional Gyro

The Sperry Directional Gyro is also an aid to navigation and is used in conjunction with a magneto, or earth inductor compass. It consists of an air-driven gyroscope carrying a compass card and provided with a locking device to permit caging the gyro so that the card can be easily turned to coincide with the reading of the magnetic compass. When the locking device is released the directional gyro is in reality a non-north seeking gyro-compass with an accuracy of 2 deg. to 3 deg. in 15 min. In long straight flying, the instrument may be reset by checking with the magnetic compass every ten to fifteen minutes. The complete installation weighs 8 lb. 4 oz., of which the instrument itself accounts for 3 lb. 12 oz. The balance of the weight is in the Venturi and the required connecting tubing.

This equipment is manufactured by the Sperry Gyroscope Company of Brooklyn, N. Y., and is now on the market for commercial use.—AVIATION, *April, 1931.*

TWO-WAY PHONE

THE use of a one-way voice phone from instructor to pupil was one step away from the era of flight instruction by hand signals. A two-way phone is now offered by the Bowers Manufacturing Company of Chicago which will find a place in schools which are making the utmost endeavor to make flying courses safer by reducing the possibilities of misunderstood instructions. The more usual one-way equipment is also offered.—AVIATION, *April, 1931.*

Side Slips

BY ROBERT R. OSBORN

THE newspapers tell of an airline pilot who called his home while carrying passengers eastward over Allentown, Pa. "The plane was equipped with a radio telephone for the receipt of weather information. The pilot, Lee Murphy, was talking to the operator at Dunnellen, N. J., who placed the loud speaker near a telephone transmitter after having called the Murphy home. 'Hello Isabelle,' Murphy said, 'I'll be home at 6; have dinner ready.' He was home at 6."

This item got into the newspapers because of the husband's arrival at the time he had promised, not because of the telephone connection as you may have thought at first. If the dinner had been ready at 6 the news would have made the front page.

▶As is so often the case the newspapers missed the really important points in their story of Miss Nichols' recent atempt at the women's altitude record—the apparently new record not having been checked officially as this is written. They printed all sorts of uninteresting data on engine speeds, fuel consumed, characteristics of the ship, and so on, and then, about the outfit which Miss Nichols wore, the following is quoted from the *Evening Post*—"Under the fur suit Miss Nichols was warmly and gaily dressed. She wore a green jersey sports skirt and four sweaters ranging in hue from old rose to purple. Around her throat and protecting the lower half of her face was a tartan plaid muffler. She wore a furlined flying helmet with a flap of badger fur to shield her forehead from the cold. Her feet and legs were protected by beige woolen hose, two layers of woolen skating socks and over that socks of reindeer hide with the fur turned inward. Short Alaska reindeer boots with gaily beaded tops completed the costume. The flying suit was made of reindeer skin also, with the fur on the outside. Miss Nichols was zippered into it and when the parka was drawn over her head there was little visible of her except her eyes and the tip of her nose."

Even with this creditable attention to detail of the costume worn by Miss Nichols there is absolutely no mention made of the outfit worn by the previous record holder, Miss Smith, and no statement whether or not Miss Nichols had broken her record for the number of flying suits worn. Did Miss Smith wear more than four sweaters and did their color range from old rose to purple and bevond? Possibly Miss Smith had a flying suit with the fur turned both inside and out? Did Miss Nichols have the latest flying suit approved by Paris or did she commit an error in not allowing her ears to be visible when the parka was drawn over her head? Not good reporting at all, you see. We'd suggest that in covering ladies aeronautical ventures in the future that the fashion editor be taken along in at least an advisory capacity.

▶As we have remarked before, the production of "mystery ships" seems to hold up even in hard times, and one of the latest, Mr. Loening's folding plane for use on submarines seems to have very mysterious characteristics, according to the newspapers. Consider the following from the N. Y. *Herald-Tribune:* "The test showed that it has a structural strength for a full power dive at better than forty-five miles an hour." (Thanks to Mr. S. D. for the clipping).

A point on which we'd like the newspapers to be more careful, is, when speaking of "airplanes designed to fold up" that they add the word "intentionally."

Adding to the mystery of the performance of this mystery ship is another item about it from a Seattle, Wash. paper, called to our attention by N.W.B. "New York, Friday, Feb. 6, Test flights have shown the new tiny monoplane built for the Navy to be carried in submarines capable of 145 miles an hour."

It would certainly be tough to be unable to catch up with the base ship again even by putting your airplane in a full power dive.

Not so remarkable, however, are the reports on this same ship found in the Mansfield (Ohio) *Journal* by C.R.P.: "New York Feb. 7 (A.P.). A seaplane so small it can be folded up and battered down to the deck of a submarine in three minutes has been flown . . . " That time for folding up and battering down has been bettered many times, even with larger ships.

▶Mr. H.M.P. of Springfield, Mass. sends in some clippings on the subject of Capt. Malcolm Campbell's speed record in an automobile on the sands at Daytona Beach, Fla. We now have a rather complete file on that record and are glad to state that still another record was set up which is even more important than the actual speed obtained. For the first time in newspaper reporting history an automobile was able to break a speed record without "traveling so fast that it was almost impossible to see it with the human eye." You may remember that the Society for the Education of Newspaper Reporters has been offering to provide witnesses with better eyesight at automobile speed meets—witnesses who had been able to see planes traveling at faster rates without difficulty, and we are pleased that the situation has at last been cleared up.

▶Mr. G.A.W. of Roosevelt Field, Long Island, comments on the present trend toward cheaper planes and points out that one manufacturer seems to be trying to get even the Scotch trade, as, according to the *Herald-Tribune,* it is provided with "free visibility."

▶"The Flying Nutmeg" our Bridgeport attention caller, mails in an interesting clipping from a local paper, describing a talk given by a war pilot before the local Y. M. C. A.

"His story of using green oranges as bombs when the bombing plane in which he and another British flier were maneuvering over the Turks, ran out of ammunition, aroused much interest. The oranges, dropped from a great height, struck the Turks with such force that they literally exploded into hundreds of pieces, he said, many of the fragments seriously wounding the enemy troops."

Anyone who has ever been hit by a fragment of a Turk knows that it makes a nasty wound.

▶"London (A.P.) John Bull has developed a terror of the skies. A single-seated biplane carries six machine guns. Two shoot through the propeller. Four are on the wings, Fired at once by the pilot, the guns make a cone of bullets that meet a few hundred years ahead." Clipping from Mr. A.H.H. of Williamstown, Mass.

While we all hope that all of these peace pacts, disarmament agreements and Leagues of Nations will be effective, it might be a good idea to start firing now for the next war.

THIS MONTH'S ASTOUNDING AERONAUTICAL EVENT

"Dalhart, Tex., Feb. 7: Barney Taylor, World War flyer who emerged from the wreckage of his plane yesterday only slightly hurt after falling 3,500 ft. to the ground, prepared today to take another plane to Los Angeles. A wing fell from Taylor's craft over a prairie 45 miles west of here. After a nose dive to within 100 ft. of the ground, the pilot caught the weight of the remaining wing in his hands and righted the craft. It landed too straight, however, flopping over on its back. Cowboys rode to his assistance, removing the wreckage from him with ropes. He walked six miles beside a cowboy and his horse to obtain an automobile to continue here. Two fractured ribs, his only injuries, prevented him from riding one of the horses." (Discovered by Lieut. Comdr. H.G.B. of Galveston, Tex.)

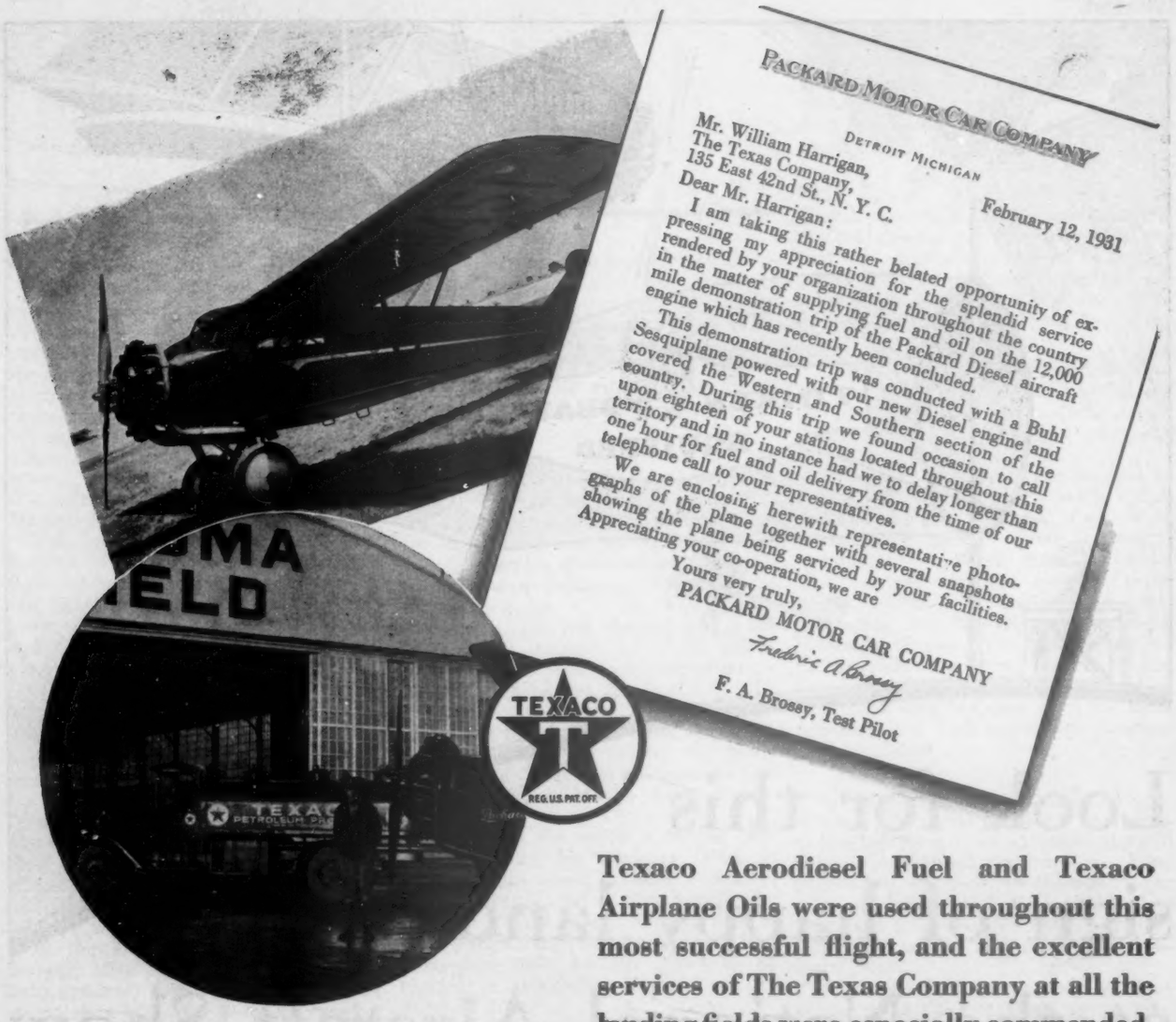
Look for this sign of happy landings at the National Aircraft Show

It shows which way the wind is blowing in the development of airplane landing gear. More and more airplane builders are standardizing their ships on Timken Bearing Equipped landing and tail wheels for greater efficiency, safety and endurance.

More and more airplane buyers are specifying Timken-equipped wheels for protection against landing hazards, early depreciation and excessive maintenance expense.

You'll find them on all types of planes at the National Aircraft Show. Taxi to the Timken hangar in Booth No. 101-103 for valuable wheel information. The wind sock will guide you. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN *Tapered Roller* BEARINGS


PACKARD MOTOR CAR COMPANY
DETROIT MICHIGAN
Mr. William Harrigan,
The Texas Company,
135 East 42nd St., N. Y. C.
February 12, 1931
Dear Mr. Harrigan:
I am taking this rather belated opportunity of expressing my appreciation for the splendid service rendered by your organization throughout the country in the matter of supplying fuel and oil on the 12,000 mile demonstration trip of the Packard Diesel aircraft engine which has recently been concluded.
This demonstration trip was conducted with a Buhl Sesquiplane powered with our new Diesel engine and covered the Western and Southern section of the country. During this trip we found occasion to call upon eighteen of your stations located throughout this territory and in no instance had we to delay longer than one hour for fuel and oil delivery from the time of our telephone call to your representatives.
We are enclosing herewith representative photographs of the plane together with several snapshots showing the plane being serviced by your facilities.
Appreciating your co-operation, we are
Yours very truly,
PACKARD MOTOR CAR COMPANY
Fredric A Brossy
F. A. Brossy, Test Pilot
TEXACO
REG. U.S. PAT. OFF.

. . . ANOTHER SUCCESSFUL FLIGHT DEMONSTRATION

Again the Packard Diesel Aircraft Engine proves its merit. Pilot Frederic A. Brossy in a Buhl Sesquiplane with the Packard Diesel Aircraft Engine covers 12,000 miles through the Southern and Western States in another brilliant demonstration of this new power of the air.

Texaco Aerodiesel Fuel and Texaco Airplane Oils were used throughout this most successful flight, and the excellent services of The Texas Company at all the landing fields were especially commended.

Texaco Aerodiesel Fuel, Texaco Airplane Oils and other Texaco Aviation Products are available at the principal airports everywhere. Planes equipped with the Packard Diesel are always assured of prompt fuel supplies at every port.

THE TEXAS COMPANY
Aviation Division
135 East 42nd Street . . . New York City

TEXACO

AERODIESEL FUEL
AIRPLANE OILS
MARFAK GREASES

A SHIP THAT FLIES AT TWO CENTS A MILE!

CURTISS-WRIGHT "JUNIOR"

Here's a ship which hops up from a five-acre field . . . climbs 600 feet a minute . . . strikes 80 miles an hour . . . cruises at 70 for hours at a time . . . handles so easily that beginners have mastered it within a day, *yet costs but two cents a mile to fly and a bare $1490 to buy!* ● And the "Junior" asks no favors of you, needs no high-priced pampering, presents no hangar or service problems. Park it out, put it in a shed, it's always ready to up and go. Simple to take off, fly, and land, the "Junior" is a ship that youngsters like. ● Yet it's so sturdily built that finished fliers can loop, dive, do all the tricks, and come out of spins "hands-off"! Due entirely to its pusher type construction, and racy, refined design, the "Junior" offers visibility as clear as from a roadster. Its slow landing speed of 28 m.p.h. and extremely nimble operating ease on or near the ground, make it just the ship for you. ● Developed by aviation's leading engineers, this new plane benefits by all Curtiss-Wright has learned in building its varied, victorious fleet. ● Go to your Curtiss-Wright dealer's. Look the "Junior" over point by point. Get in . . . and fly it yourself!

CURTISS-WRIGHT

AIRPLANE COMPANY

ROBERTSON, MISSOURI

FACTORIES: ST. LOUIS, MO. WICHITA, KAN.

NIMBLE FOR SPORTSMEN

SIMPLE FOR STUDENTS!

TRAVEL AIR

SPORT-TRAINER

Racy and rugged for sportsmen, sturdy and stable for students, the sleekly stream-lined new TRAVEL AIR *Sport-Trainer* is a striking example of the benefits you gain in a ship built by the biggest builders of many types of planes. ● For this latest TRAVEL AIR model offers any number of new developments in stability, handling and servicing ease, and smart, sporty looks, which can be effected only when an organization builds for the whole field. ● You'll like the *Sport-Trainer's* clean-cut lines, its smooth sure speed of over 100 miles an hour, and its cruising range of better than 500 miles. ● For this sturdy ship is so nimble getting off the ground or floating back, so stable in the air, that it's indeed the sportiest of ship's to fly. ● Powered with the world-famous Wright-Gipsy engine, equipped with a remarkable development in full tread, shock-absorbing landing gear plus brakes, the Sport-Trainer is designed in every detail to make flying not only simple but inexpensive. See this TRAVEL AIR at your Curtiss-Wright dealer's now. Compare its value! Fly it on your own!

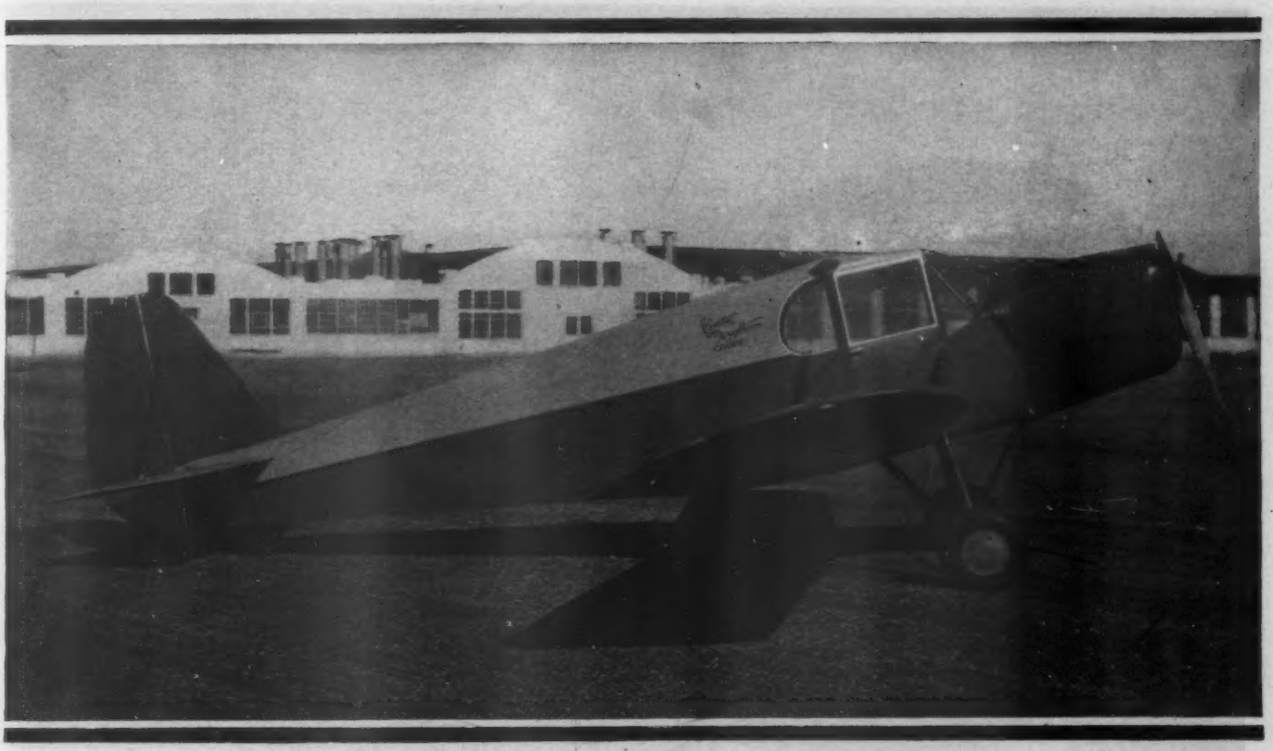
CURTISS-WRIGHT

AIRPLANE COMPANY

ROBERTSON, MISSOURI

FACTORIES: ST. LOUIS, MO. WICHITA, KAN.

A SNUG AND COZY CLOSED PLANE THAT'S ECONOMICAL TO FLY . . !



Curtiss-Wright's new COUPE is a strikingly streamlined, low wing monoplane, that makes flying cross-country in seats side-by-side just as cozy as a car at a cost approximately the same. ● Its world-famed Wright-Gipsy engine of 90 h. p. gives you power and speed galore. It takes off and lands lightly on the roughest, toughest fields. For shocks are smoothly absorbed by its oleo struts, its semi-balloon wheels mounted on a wide, solid landing gear. ● The COUPE'S cabin is smartly finished with deep upholstery. Protected from wind, weather, and noise you speed in the COUPE at 110 m. p. h. . . . cruise at 90 for 500 miles or more . . . enjoy perfect visibility on all sides from your roomy and completely equipped interior. ● Then there's the added satisfaction of handling a ship so sturdily built, so simple to control, that it's one of the easiest in the world to fly. ● To appreciate fully what Curtiss-Wright engineers have accomplished in producing this rugged, refined little plane, to sense its sporting performance, its economy of 15 miles to a gallon of gas, go to your Curtiss-Wright dealer's right now. Get in this ship and see for yourself! Comparison is the best test.

CURTISS-WRIGHT

AIRPLANE COMPANY

ROBERTSON, MISSOURI

FACTORIES: ST. LOUIS, MO. WICHITA, KAN.

BEAUTY IN EVERY LINE
PERFECTION IN PERFORMANCE!

CURTISS·WRIGHT
SEDAN

Offering all the strength and stamina of the world-famous maker and breaker of records for endurance, the striking new Curtiss-Wright SEDAN is a cabin monoplane for four that's as smart as it's sturdy, as racy as it's reliable. ● For into this luxurious foursome flier Curtiss-Wright's engineering staff at Wichita has incorporated devices and ideas developed in years of research and production of practically every type of plane that flies. ● Powered with either a Challenger engine, of endurance fame, a 210 horsepower Kinner, or the world-proved "Whirlwind 240," this remarkable new SEDAN has repeatedly proved its ability to out-climb, out-ride, and completely out-maneuver plane after plane put up as its match in size, type, power, or price. ● In snug comfort you relax, revel in the SEDAN'S luxurious furnishments and roominess, while this stable, smooth-riding ship *makes each minute mean nearly two miles for 500 miles at a stretch.* ● With every feature of comfort for passengers, with every convenience for the pilot, built to stand rough going aground and hard usage aloft, this new Curtiss-Wright enclosed ship is the plane you'll be proud to own. Go and see the SEDAN at your nearest Curtiss-Wright dealer's now. Get in and try it. You'll want to sail it away!

CURTISS-WRIGHT
AIRPLANE COMPANY
ROBERTSON, MISSOURI

FACTORIES: ST. LOUIS, MO., WICHITA, KAN.

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A New Remote Reading Compass

Light weight.
No rotating parts.
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No parts exposed to slipstream.
Can be placed in wing if desired.
Requires practically no servicing.

Drift Meter—Type 625

Light and compact.
Mounts in floor of plane.
Easy to use.
Can be sighted on ground lights at night.

Aircraft Octant—Type 342

Entirely new design—small, compact and rugged.
Observations easy to make.
Optical and moving parts protected.

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Designed for moderate priced planes.
Contains Tachometer, Altimeter, Thermometer and Oil Pressure Gauge.
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See these products at the National Aircraft Show, or write us for particulars.

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Here is high speed and maneuverability combined at last with safety, efficiency and unusual ease of operation under all conditions of flight.

And performance! The "Wasp"-powered Alpha climbs 1400 feet per minute with a disposable load in excess of 1900 pounds—cruises at 150 miles per hour—has a flying range of 700 miles or more.

Exclusive Northrop features . . . Multi-cellular wings and tail surfaces of metal—rugged, durable and of unexcelled rigidity; a metal monocoque fuselage accessible and sturdy. Wings and fuselage form a unit structure that insures perfect alignment throughout its service life.

NORTHROP AIRCRAFT CORPORATION . . . UNITED

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Other points of superiority . . . Marked economy of operation; unequalled passenger comfort, resulting from scrupulous attention to the elimination of noise and vibration—together with provision for adequate ventilation and temperature control. The roomy, luxuriously appointed cabin is truly a revelation.

Behind the perfection of the Alpha is the proved genius of its designer—Mr. John K. Northrop, originator of many famous commercial and military craft.

We invite you to inspect the Northrop Alpha at the Detroit Aircraft Show. Also, write us for a descriptive booklet giving specifications, equipment and prices. Demonstrations can be arranged.

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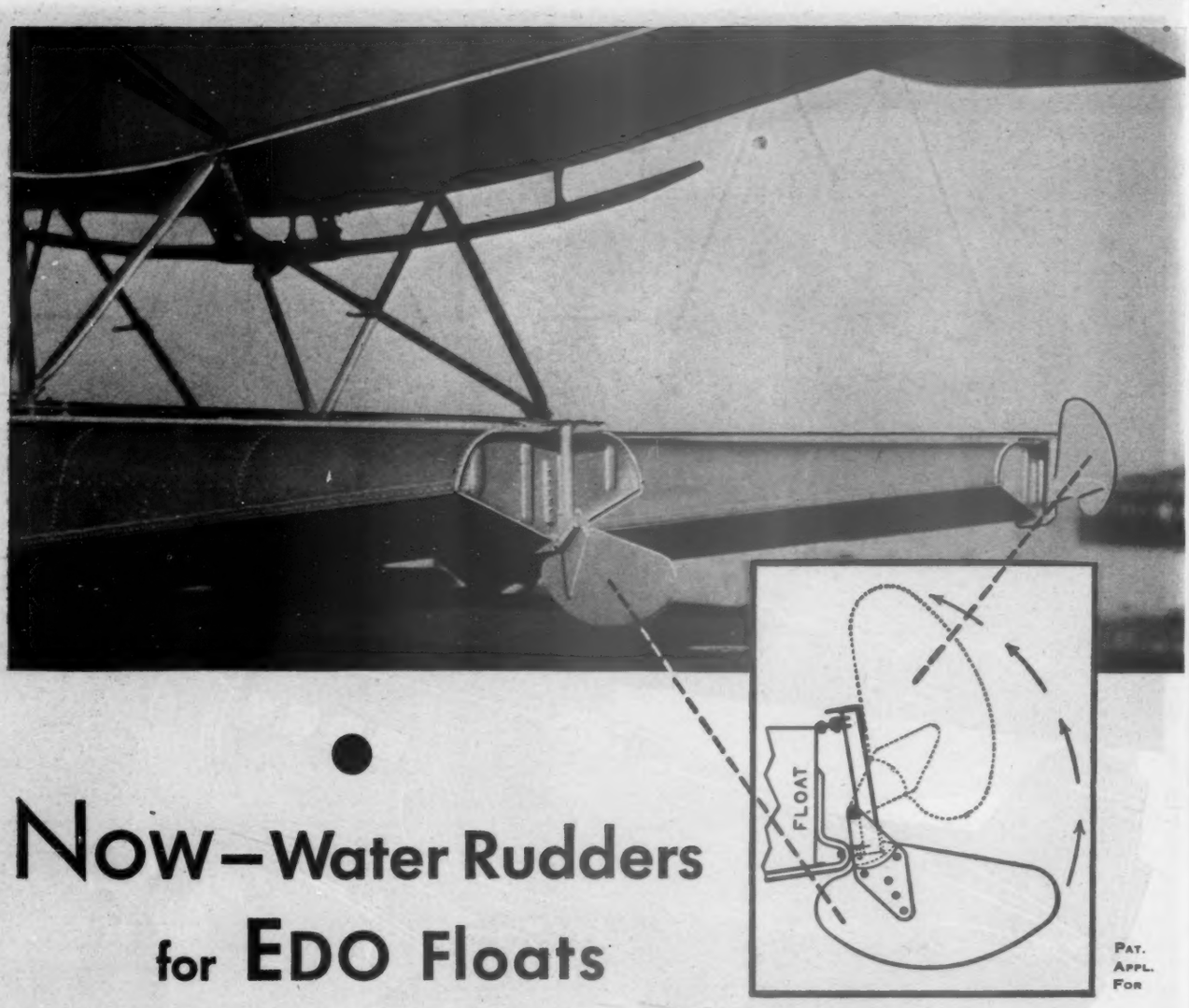

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AUTOMATIC water rudders developed by EDO bring a new efficiency to float performance. Coupled with the broad planing stern of EDO Floats, seaplanes so equipped may now be taxied on the water with the same sharp, sure response of a motor boat. By their use, the possibility of engine-overheating and spray damage to propeller in taxying is eliminated, and maneuvering in limited space is made positively easy.

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EDO Automatic Water Rudders are available for all standard sizes of EDO Floats. For further information and prices, address, EDO Aircraft Corporation, 600 Second Street, College Point, Long Island, N. Y.

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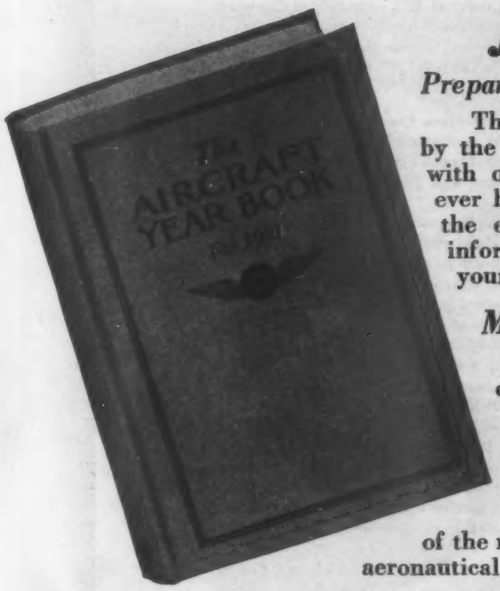
THE AIRCRAFT YEAR BOOK *for* 1931



Prepared by The Aeronautical Chamber of Commerce of America, Inc.

The thirteenth annual edition of "The Aircraft Yearbook," just prepared by the Aeronautical Chamber of Commerce of America, Inc., in cooperation with officials of the Government service, contains more valuable data than ever before. Experts in every phase of industry have collaborated. Besides the engineering detail there is a great amount of business and general information on aviation essential in every phase of activity. It brings within your arms' reach a complete reference of the entire world of flying.

More Than 150 Pages of Aircraft and Engine Designs

Many remarkable features make up the engineering information contained in this book. First there are more than 150 three-view drawings of the leading airplanes and engines now produced in the U. S. including all of the new models introduced during 1930. There is a complete, concise account of the products of each manufacturer in operation at the opening of 1931 including aircraft, engines, and their parts and accessories. Further, there is a remarkable account of the new engineering developments, to which twenty of America's outstanding aeronautical engineers and designers have contributed.

200 Illustrations, Graphs and Airway Maps

The Aircraft Year Book contains over 200 photographic illustrations, as well as airway maps of the United States, South America, Europe, and full treatment of varied aids to navigation. And to make the volume absolutely complete, a day-by-day chronology of aeronautical events in 1930 has been included. The book is durably bound to withstand constant handling.

What's Ahead for 1931?

This year more than ever before, everyone in the Aviation industry is vitally interested in future trends and future possibilities. In this book all the events of 1930 are explained with particular interest to future prospects. Here are the answers to the important questions of growth of American transport lines, development of world airship services, and probable trends in commercial aircraft production and operation. Just hat can be expected during 1931 is forecast in this book.

Names of Sections

What's Ahead for 1931; *Indices to Progress in* 1930; *Over the Nation's Air Lines; Latin America by Air; Projected World Airship Services; A'Wing With the Army Air Corps; With the Navy's Flying Fleet; History Making Flights of* 1930; *Manufacturing American Aircraft; Producing American Engines; Preening Wings of Commerce; Air Terminals on Land and Sea; Airplanes: Jacks of All Trades; Aviation in School and College; Wings for Women; The Lawmaker in Aviation; World Aviation in* 1930; *Out of the Engineering Laboratory; Aircraft and Engine Design Section; Chronology; Appendix; Trade Index; Index.*

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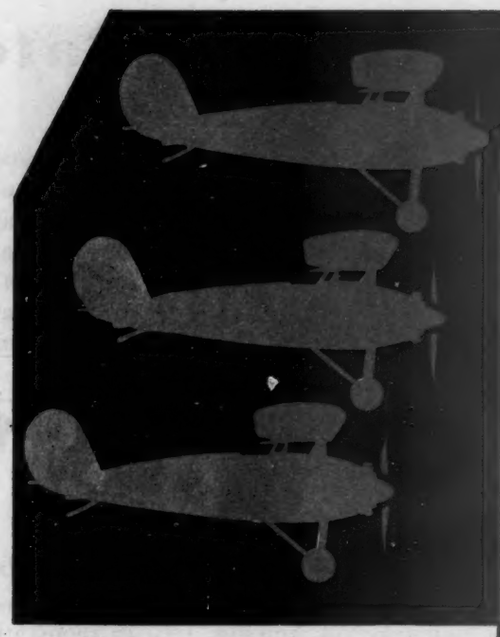

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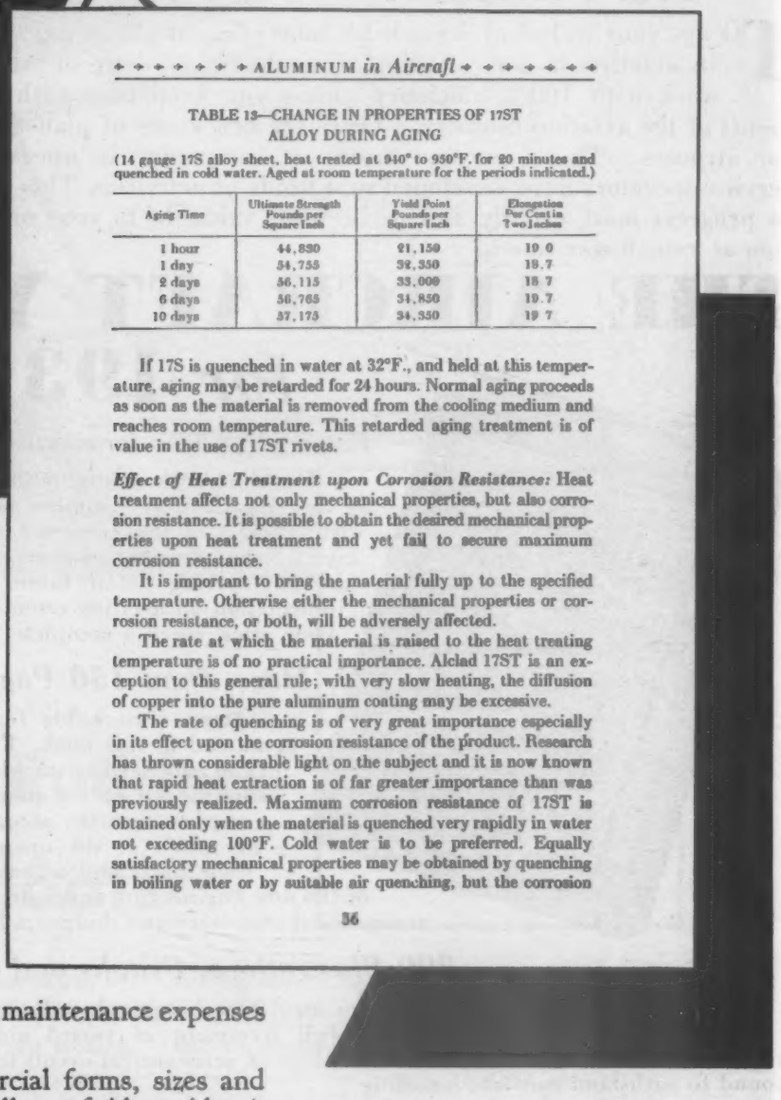

ALUMINUM *in Aircraft*

TABLE 13—CHANGE IN PROPERTIES OF 17ST ALLOY DURING AGING

(14 gauge 17S alloy sheet, heat treated at 940° to 950°F. for 20 minutes and quenched in cold water. Aged at room temperature for the periods indicated.)

Aging Time	Ultimate Strength Pounds per Square Inch	Yield Point Pounds per Square Inch	Elongation Per Cent in Two Inches
1 hour	44,830	21,150	19 0
1 day	54,755	32,350	18.7
2 days	56,115	33,000	18 7
6 days	56,765	34,850	19.7
10 days	57,175	34,350	19 7

If 17S is quenched in water at 32°F., and held at this temperature, aging may be retarded for 24 hours. Normal aging proceeds as soon as the material is removed from the cooling medium and reaches room temperature. This retarded aging treatment is of value in the use of 17ST rivets.

Effect of Heat Treatment upon Corrosion Resistance: Heat treatment affects not only mechanical properties, but also corrosion resistance. It is possible to obtain the desired mechanical properties upon heat treatment and yet fail to secure maximum corrosion resistance.

It is important to bring the material fully up to the specified temperature. Otherwise either the mechanical properties or corrosion resistance, or both, will be adversely affected.

The rate at which the material is raised to the heat treating temperature is of no practical importance. Alclad 17ST is an exception to this general rule; with very slow heating, the diffusion of copper into the pure aluminum coating may be excessive.

The rate of quenching is of very great importance especially in its effect upon the corrosion resistance of the product. Research has thrown considerable light on the subject and it is now known that rapid heat extraction is of far greater importance than was previously realized. Maximum corrosion resistance of 17ST is obtained only when the material is quenched very rapidly in water not exceeding 100°F. Cold water is to be preferred. Equally satisfactory mechanical properties may be obtained by quenching in boiling water or by suitable air quenching, but the corrosion

36

There are many other pages on the subjects of cold working, heat-treating, annealing and welding

Such data, themselves, would be worth 50 cents. But read what else is crammed between the covers of this book. Data on the construction and assembly of wings, fuselage, hulls and pontoons of Alcoa Aluminum. Pointers on the shop equipment required for the repair of aluminum parts and planes. A 13-page chapter for operators of air lines on how to keep maintenance expenses at a minimum.

Chapter 8 gives in detail the commercial forms, sizes and specifications under which the strong alloys of Alcoa Aluminum for aircraft may be purchased.

All of this information is a result of our 14 years' work devoted to the use of Alcoa Aluminum and its strong alloys in aircraft—work in which we have checked and rechecked our findings with the U. S. Bureau of Standards, U. S. Army Air Corps, U. S. Navy Bureau of Aeronautics, The Naval Aircraft Factory, and with airplane manufacturers, operators, pilots and mechanics.

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THE ONE METAL THAT FLIES BEST

Now
A CABIN WACO
as a companion to the popular model 'F'

AN ALL-WEATHER ALL-PURPOSE AIRPLANE

These are the requirements originally laid down to WACO engineers for the development of a cabin WACO ● ● (1) To design a 4-place cabin ship with performance characteristics typical of WACO open-cockpit ships, particularly as to ability to get into and out of small fields ● ● (2) To retain the economies in weight and size inherent in biplane construction, but to provide wider angles of vision than any biplane has ever before permitted ● ● (3) to keep the price below $6000, but to sacrifice no practical refinements, and to give a measure of value beyond comparison ● ● ● Large order that, but nothing less would justify an attempt to earn the same dominance in the field of cabin airplanes that WACO has so long enjoyed among open-cockpit ships ● ● ● After many months of development these specifications have been not merely satisfied but exceeded. The measure of accomplishment we confidently leave to your judgment. Complete details at your request. Ask also about the brilliant new WACO "Model F2" with Continental 165 h. p. engine.

• Open-model PERFORMANCE in an enclosed ship • Monoplane VISIBILITY in a biplane design • and VALUE that challenges comparison

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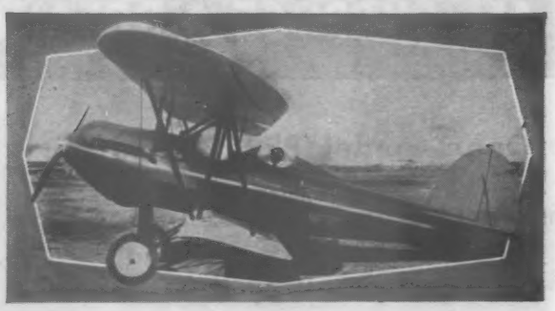

ALL BIRD PLANES ARE EQUIPPED

An outstanding 5-place cabin plane at a price within the reach of all, with efficiency to carry big payloads and all the safety for which the **BIRD** has always been famous.

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PRICES THAT DEFY COMPETITION. A DEALERS' PLAN THAT MEANS REAL PROFITS. GET IN TOUCH WITH US AT THE SHOW OR FACTORY

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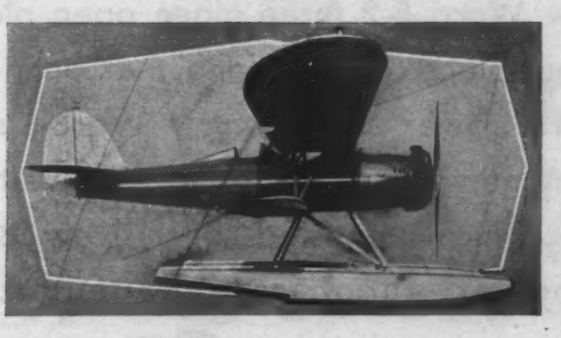
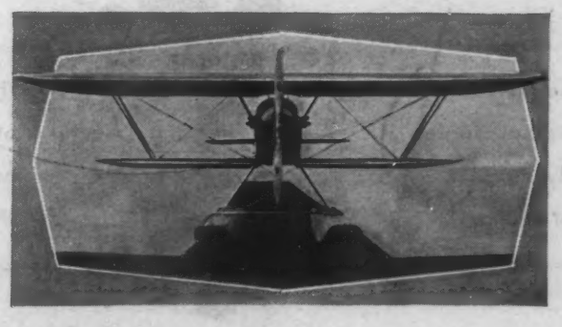


The 4-place Kinner **BIRD** equipped with pontoons has taken off repeatedly fully loaded to 2800 lbs. in 15 sec.



A seaplane with the performance of a land-plane. The land and water gears are quick-ly inter-changeable.

BIRD 100 h.p. 3-place open cockpit, dual control, approved type certificate No. 239. Price . . . $3895

The SAFE *Airplane*

WITH LUGGAGE COMPARTMENTS

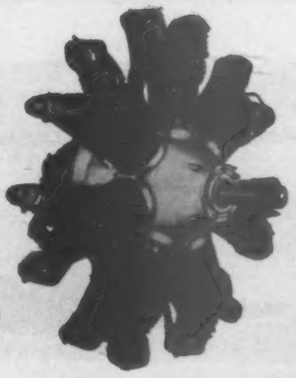
WACO

BUILDS FOR 1931

Waco selects the Continental A70 second series engine for 1931 models

In the new *Waco F-2* three-place open plane, and in the new *Waco C* four-place cabin biplane, the Continental A70 is specified as standard power equipment. • Waco's selection of the Continental engine was made after exhaustive tests over a period of six months, which supported conclusively its already established reputation for smoothness, dependability and stamina.

The Second Series Continental 7-cylinder Radial Engine is conservatively rated at 165 h. p. Navy Test Rating 177 h. p.



The extremely low operating and maintenance costs are additional reasons for the choice of Continental Engines.

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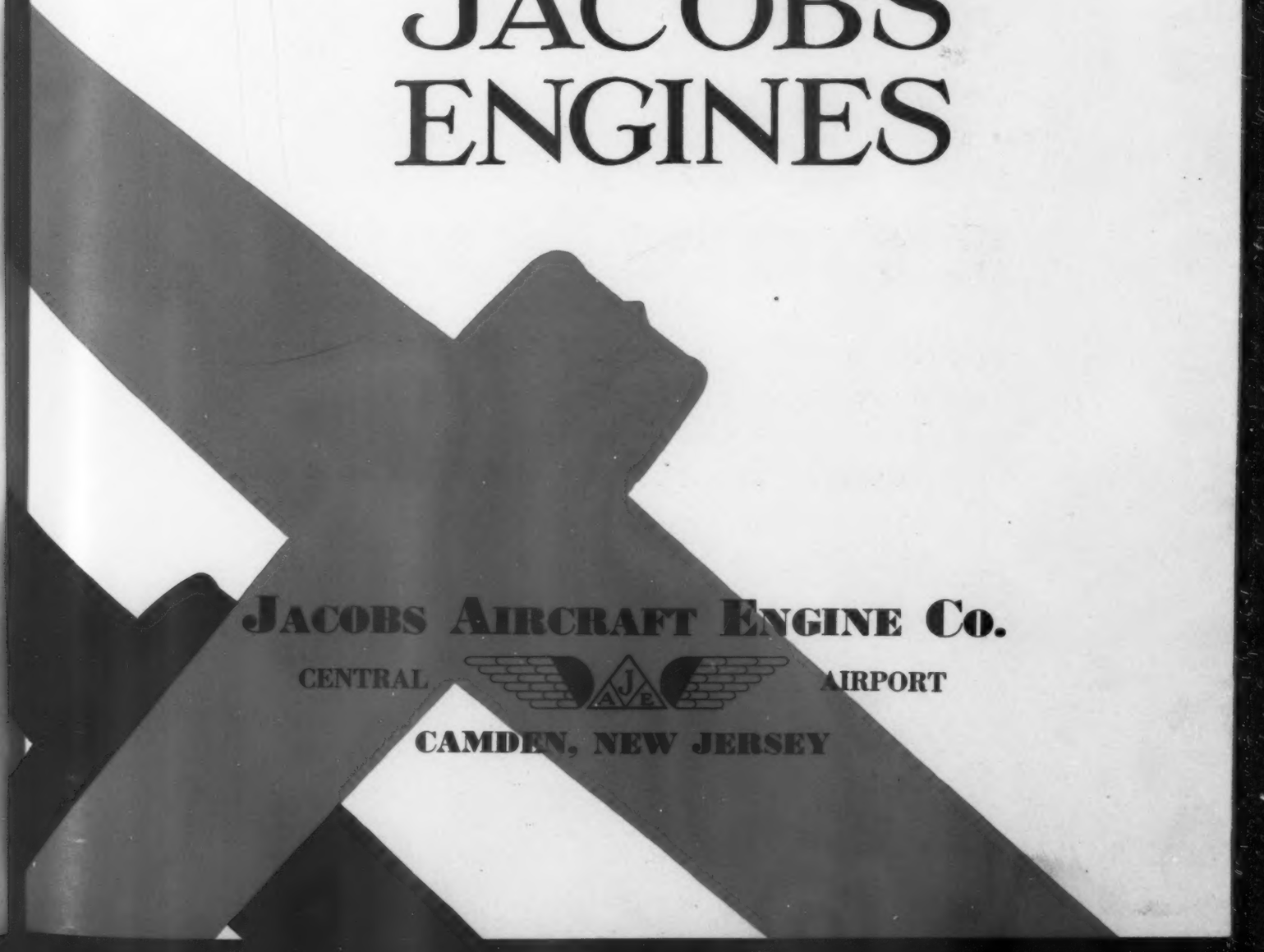
Continental
for the Airways of America

SMOOTHER POWER....

Announcing the 1931 SERIES JACOBS ENGINES



JACOBS AIRCRAFT ENGINE CO.

CENTRAL AIRPORT

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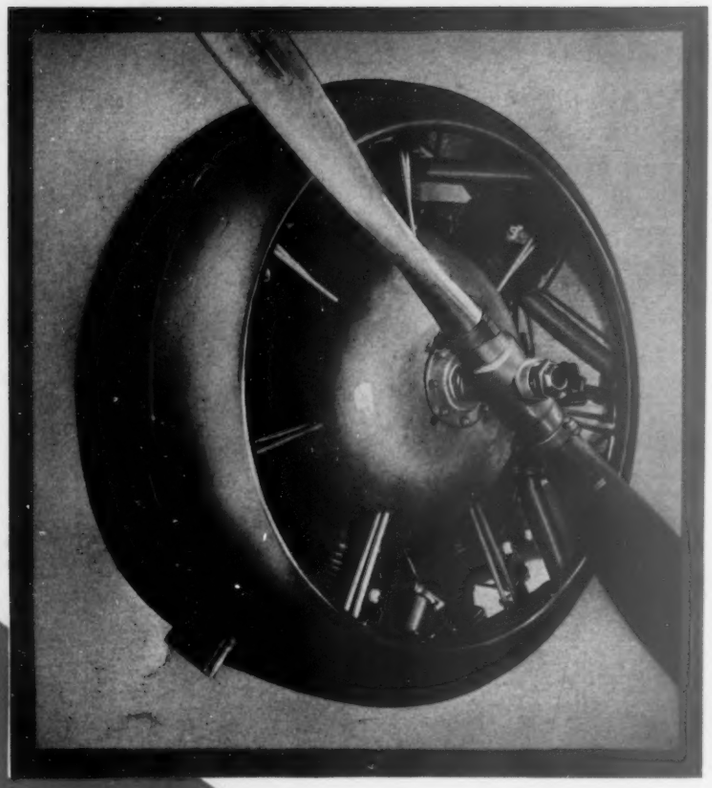
.... *and more Dependability*
in the JACOBS 150



This unit will be featured in BIRD planes at the show

ECONOMY

High quality and accuracy of the JACOBS 150 insure lower depreciation and maintenance costs - - longer periods between overhaul - - low compression permits use of low test gas - - giving more engine hours and MORE MILES PER DOLLAR.

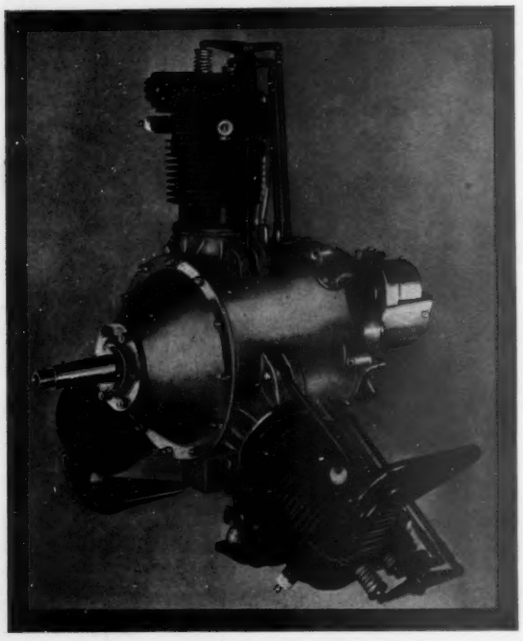
ACCESSIBILITY

The JACOBS 150 is easier to service with cowling in place than the ordinary engine without cowling. All adjustable parts are instantly accessible.

It is furnished to plane manufacturers with mounting board and combination collector ring and cowling - - a complete power unit.

. . . and now JACOBS ANSWERS THE DEMAND

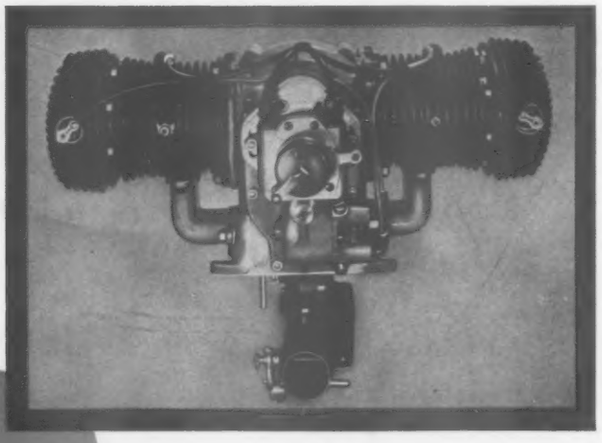
for dependable power for the Light Plane and Glider



JACOBS 60

A really high-class engine for the light - sport - plane, embodying all the JACOBS' characteristics of . . . dependability, endurance and economy.

The 60 can be seen at the show in the new SPARTAN light planes.



JACOBS *MIDGET*

25 reliable horse-power in a light, compact two cycle engine for the Power Glider.

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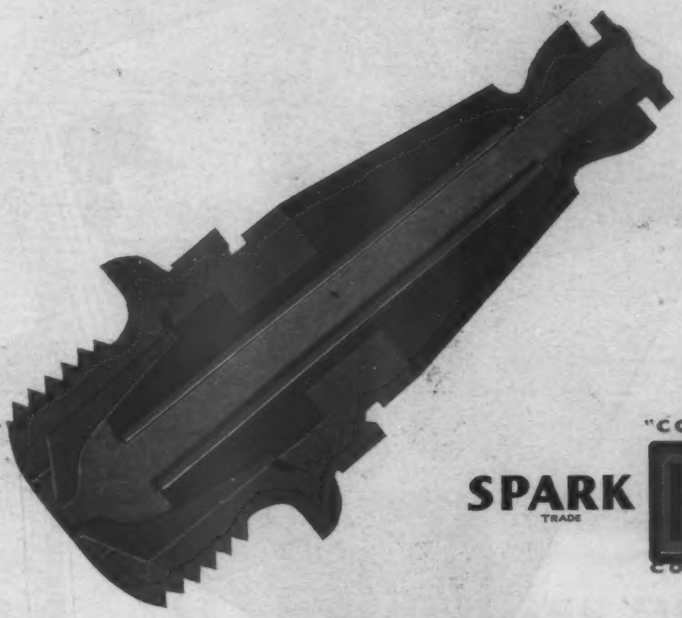
NOW . . .

three times as many flying hours with

"COPPER COOLED" MICA SPARK PLUGS



"COPPER COOLED" SPARK PLUG TRADE MARK H-T

COPPER CONDUCTS HEAT TEN TIMES AS RAPIDLY AS STEEL and Roy T. Hurley, pioneer designer of mica spark plugs, has utilized this fact in making the H-T spark plug.

A COPPER tube runs the entire length of the H-T plug, which carries away the heat from the nose so rapidly that pre-ignition is effectively prevented without resorting to the usual short nose with its constant danger of fouling.

This COPPER tube is triple expanded prior to introducing the center electrode, so that unlimited expansion of the tube becomes possible and a complete gas tight plug is assured.

This COPPER tube also gives excellent contact with the mica washers and increases the heat flow without danger of split nose washers.

This COPPER cooling jacket surrounds a center electrode of special alloy steel, which materially reduces nose temperature and consequent electrode burning.

H-T "COPPER COOLED" spark plugs have been subjected to the most grueling tests by our leading motor manufacturers and we feel confident will triple your flying hours.

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(Insert shows closeup of rotor spindle mechanism)

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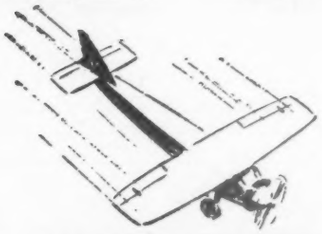

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Laboratory Tests

By the use of the facilities of the Standard Oil Company of California, Standard Oil Company (Indiana), and the Standard Oil Company of New Jersey, constant and exacting supervision is maintained by the Stanavo Specification Board over the manufacture and distribution of Stanavo products.

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Cooperation with Government Services

» *Visit the Stanavo Exhibit at the National Aircraft Show.*

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Imperial Oil, Ltd.	Standard Oil Company (Indiana)
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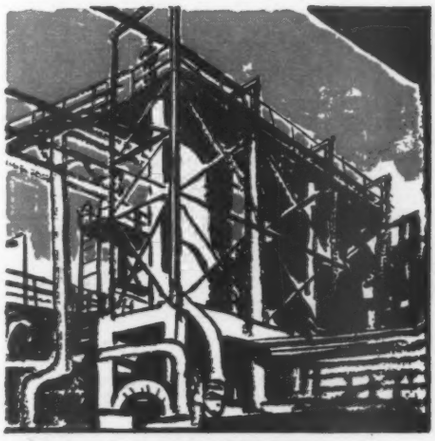
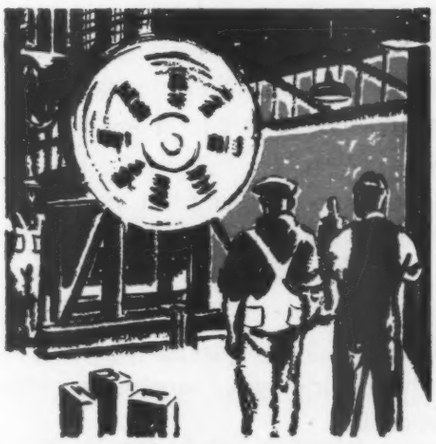


Supervision of Refining



Cooperation with Engine Manufacturers

Aviators everywhere know about STANAVO—so do transport managers. Stanavo Aviation Engine Oil—in less than two years—has been adopted for exclusive use in a majority of transport planes in the United States and many foreign countries.

Stanavo Aviation Gasoline—equally popular—is the finest aviation engine fuel sold from Coast to Coast, and everywhere the same quality.

"The best is none too good for aviation" is the creed of Stanavo Specification Board, Inc. Membership includes both scientists and practical aviators who have available the laboratories and experience of three of the world's great oil companies.

STANAVO

AVIATION ENGINE OIL AND GASOLINE

One Brand—Stanavo—One Quality—
The Highest—Throughout the World

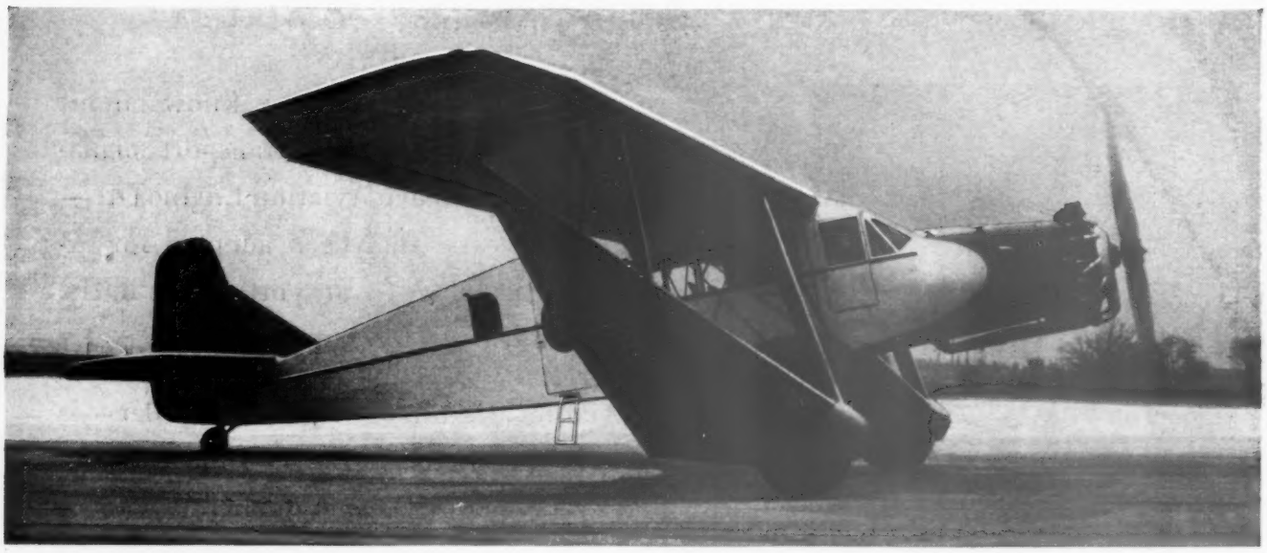
STANAVO SPECIFICATION BOARD, INC.

225 Bush Street, San Francisco, California
910 South Michigan Avenue, Chicago, Illinois
26 Broadway, New York City

are sold by:

Standard Oil Company of New Jersey
Standard Oil Company (Ohio)
Standard Oil Company of Pennsylvania
Tropical Oil Company
Utah Oil Refining Company
West India Oil Company

BELLANCAS WITH SINGLE ENGINES DOUBLE EFFICIENCY AND ASSURE SAFETY OF AIR TRANSPORTATION . . . . .



The AIRBUS

12 Place; 11 Passengers, Pilot and 1,075 lbs. of Baggage and Cargo.

Fuel sufficient for 700 miles cruising range. Cruising speed of 120 m.p.h.

PAYLOAD: twice that of other single-engined transport planes of similar horsepower. Consists of 11 passengers and 600 lbs. of baggage and cargo carried in cabin baggage compartment and 450 lbs. in nose compartment. Total, 2,945 lbs.

OPERATING COST: half that of multi-engined airplanes of similar load capacity. The single Cyclone engine is economical to operate. The 200 gal. gasoline capacity provides a cruising radius of 700 miles.

SAFETY: due to that perfection of flying qualities, control, and quiet comfort which only the single-engined airplane provides, as the history of aviation has proved.

THE RESULT: earning capacity far beyond that of any aircraft as yet produced.

All Bellanca Aircraft Manufactured under Department of Commerce Approved Type Certificates

Write for Literature and Further Information

The PACEMAKER—6-Place Monoplane with Whirlwind 9—300 h.p. Engine

The same excellent characteristics are embodied in the Pacemaker and the Wasp-engined Skyrocket, both 6-place single-engined ships which are known the world over for their extraordinary performance and have earned for Bellanca an unparalleled record for safety and endurance.

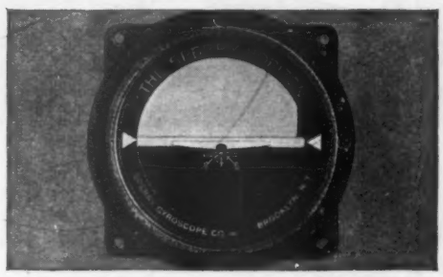
BELLANCA AIRCRAFT CORPORATION

New Castle, Delaware **Chrysler Building, New York**

Bellanca Aircraft of Canada, Ltd., Montreal

BELLANCA

AGAIN



"PRECISION"

CONTRIBUTES TOWARD SAFE FLYING!

Darkness, clouds, fogs, storms—to master them has been one of aviation's big problems. For "blind flying", with all landmarks hidden, is often necessary if flying schedules are to be maintained.

The "Sperry Horizon"—which places before the pilot an infallible "artificial horizon"—has provided the needed adjunct to the instrument equipment by which the pilot directs his flight. And today it is rapidly being adopted as standard equipment on mail, passenger and transport air lines.

In the "Sperry Horizon" (the latest of the many important contributions made by the Sperry Gyroscope Co. Inc. of Brooklyn, N. Y.) six NORMA-HOFFMANN Precision Bearings are used.

Two of them, on the rotor shaft of the gyro, operate up to 14,000 R. P. M.—speedability is the essential, here. The other four, in the gimbal mounting, make only a fraction of a revolution—here friction-free delicacy is demanded. PRECISION satisfies both requirements.

Over the entire range of speeds and loads, there is a PRECISION Bearing for every duty. Send for the Catalogs and make your selection—or ask our engineers to assist you.

You are cordially invited to visit us at the Detroit Aircraft Show—Booths 57-59, Herbert Hoover Airway

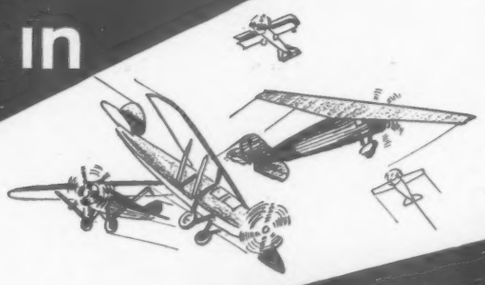
"NORMA-HOFFMANN"

PRECISION BEARINGS

BALL, ROLLER AND THRUST

NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN., U.S.A.

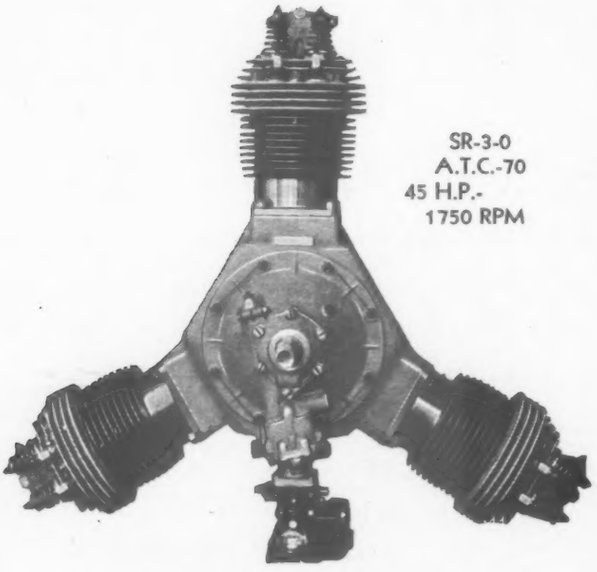
Light planes are in the spotlight



and the Leaders are powered by SZEKELY

ADOPTED BY

Curtiss-Wright
Buhl Aircraft
American Eagle
Spartan Aircraft
Nicholas-Beazley
Rearwin Aircraft
Liberty Aircraft
Prest Airplane Co.
Harper Aircraft
Crawford Airplane Co.



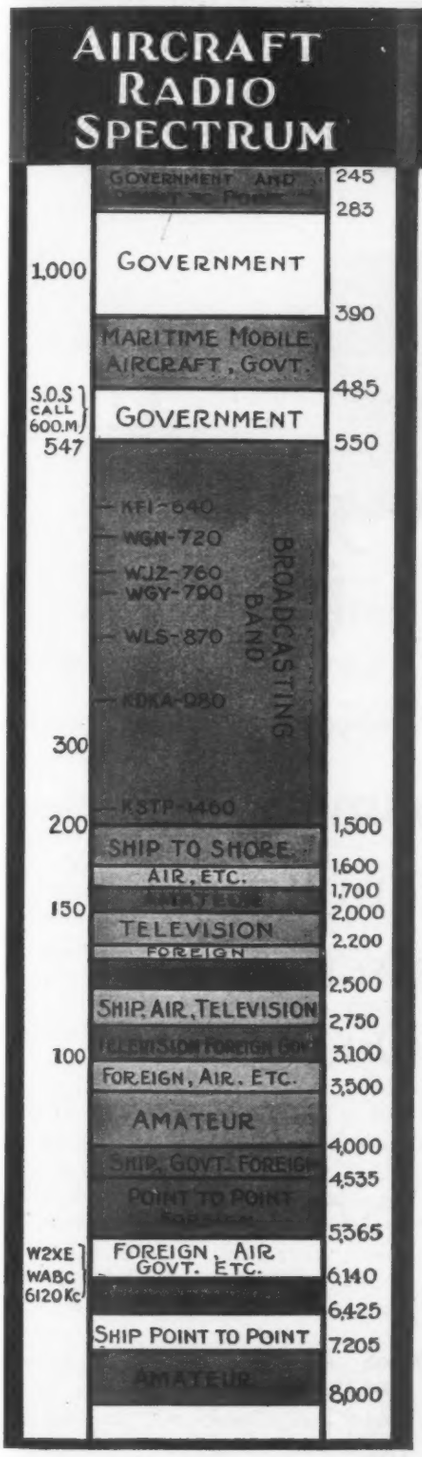
SR-3-0
A.T.C.-70
45 H.P.-
1750 RPM

SR-3-L
A.T.C.-53
30 H.P.-
1750 RPM

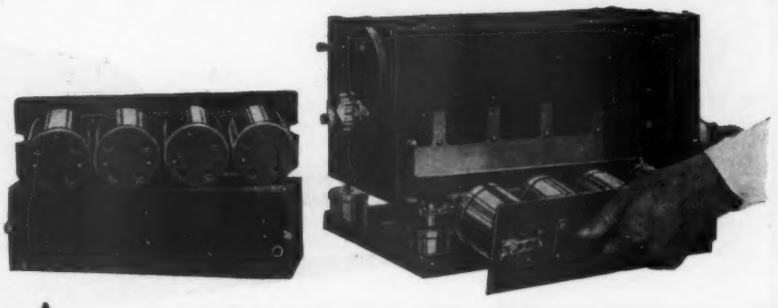
It's significant, but not surprising, that SZEKELY engines are the choice of those setting the pace in the light plane field.

Designed and developed for over two years, for this specific service, these engines provide the necessary economy, efficiency and durability, with ample power at slow engine speeds—1500 to 1800 r.p.m.

SZEKELY AIRCRAFT AND ENGINE COMPANY - HOLLAND - MICHIGAN



Stromberg-Carlson Aircraft Receivers are licensed under A. T. and T. Co., R. C. A., R. F. L. and Aircraft Radio Corporation patents.



AN AIRCRAFT RECEIVER

Adjustable to the Entire Aircraft Radio Spectrum

THE new Model D Stromberg-Carlson Aircraft Receiver has greatly widened the scope and usefulness of radio in all flying activities. Through an ingenious arrangement permitting the interchanging of coils, universal adaptability to the entire aircraft radio spectrum is obtained. These coil sets are mounted upon an individual panel with handle attached, which may be inserted or removed, easily and quickly, at the will of the operator.

Besides its universal serviceability, the new Model D Aircraft Receiver possesses other unique features: It is exceptionally light in weight, yet rugged and durable; extremely simple in design, yet highly sensitive and selective; and it is absolutely dependable under the most adverse weather conditions. It is a product of more than 36 years' experience in the telephone science from which many major radio advancements have originated.

We shall be glad to send you, upon request, a copy of our new brochure containing complete information about the Model D Aircraft Receiver.

STROMBERG-CARLSON TELEPHONE MFG. CO., ROCHESTER, N. Y.

Address all inquiries to our sales representative, Aircraft Radio Corporation, Boonton, N. J.

Model D Aircraft Receiver equipped with Eveready Raytheon 4-Pillar Tubes and powered by Eveready Dry Batteries. Over-all Dimensions of Receiver and Mounting Base: 16½ x 9½ x 9¼ inches. Weight: 18 lbs.

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR MORE THAN THIRTY-FIVE YEARS

THE KARI-KEEN

Manufactured Under A.T.C. No. 331

sets the pace for 1931 value! Super performance—still more cabin room—a cabin ship within the reach of the multitude—carrying capacity—pilot—passenger and ninety pounds of baggage! Operates for less than two cents per mile. Visit the KARI-KEEN display at the Detroit show.

The new KARI-KEEN is offered with a choice of power plants each priced lower than any other ship of equal size and carrying capacity—

Lambert	90	$3365
Warner	90	3495
Tiger	90	3495
Warner Sr.	110	3795

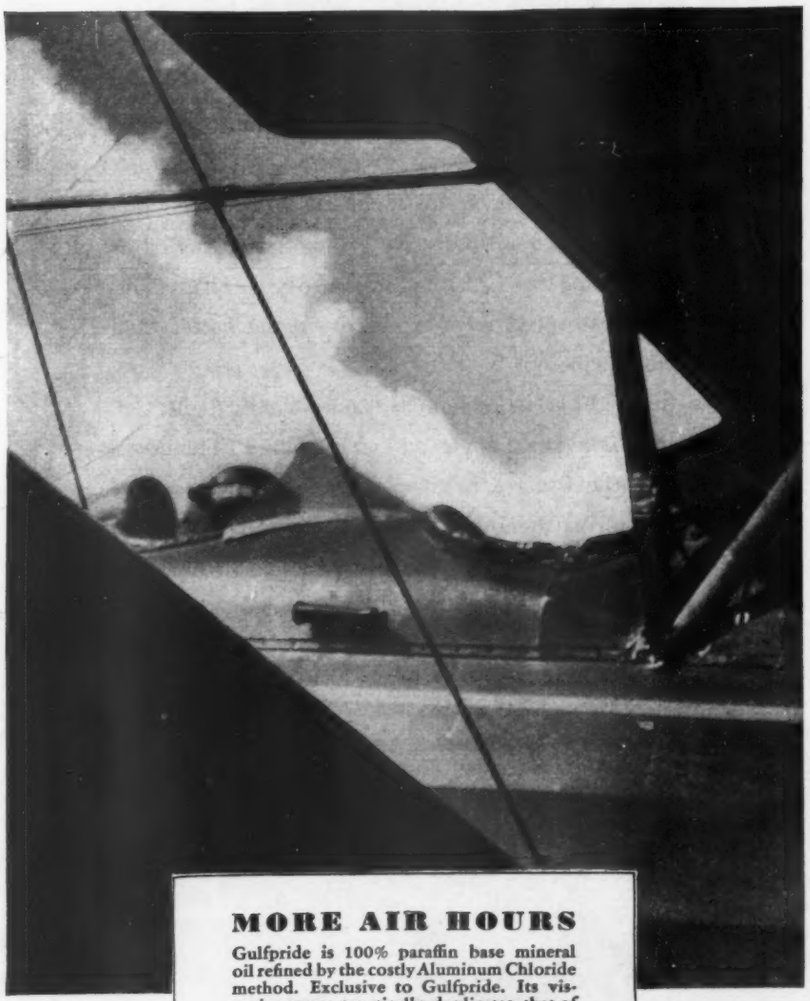
Electric self starters are optional at $175 Additional.

MANUFACTURED BY

THE SIOUX AIRCRAFT CORP.

SIOUX CITY, IOWA

No sir... oils are *not* "all alike"



. . . if you think they are, just read these quick facts!

Gulfpride is refined with aluminum chloride, costing $100 per ton. Contrast this with the $10-per-ton acid commonly used.

Gulfpride 120 shows a carbon residue (Conradson test) of 2/10ths of 1% . . . that's 84% *less carbon* than the next best oil that has ever been offered for aeroplane use.

Gulfpride 120 increases R. P. M's. You can prove this by any fair test you want to make. The difference is big enough for any experienced pilot to see.

Once you try it, we feel sure you'll ask for Gulfpride 120 every time you tell a ground crew to "oil her up".

RECORDS? You'll find them listed in the Gulfpride Aviation Atlas. New edition ready soon. Free to licensed pilots and to students of recognized flying schools. Price to others 50¢. If you want a copy just write to Gulf Refining Co., Lubricating Dept., General Sales Offices, Pittsburgh, Pa., U. S. A.

MORE AIR HOURS

Gulfpride is 100% paraffin base mineral oil refined by the costly Aluminum Chloride method. Exclusive to Gulfpride. Its viscosity curve practically duplicates that of highest grade castor oils. Yet Gulfpride has none of castor's gum forming tendency.

Gulfpride holds its body at high temperatures and resists breaking down under motor heat. It is highly resistant to oxidation and emulsifying action.

Gulfpride is made in five viscosities; 75-100-120-150 and 200 at 210°F, providing a superior lubricant for all types of aircraft motors, under all operating conditions.

Ask for Gulfpride 120 and you'll never be grounded because of oil-caused trouble.

Gulfpride Oil

GULF

• GULF REFINING COMPANY •

FAMOUS FLIGHTS WITH THOMPSON VALVES

Again with . .
COL. LINDBERGH
• IN A •
RECORD-BREAKING FLIGHT

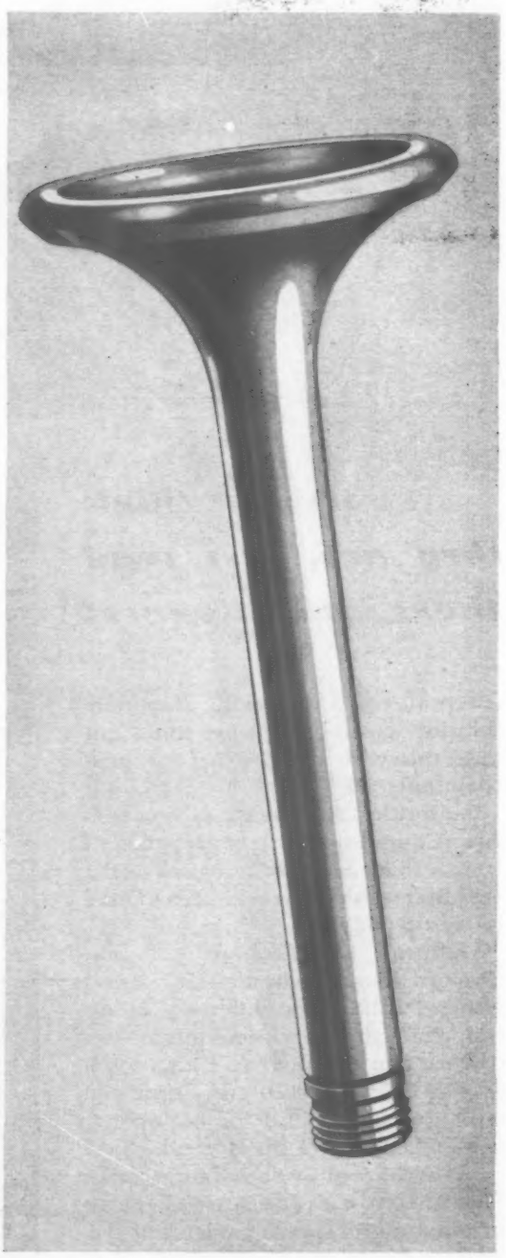
On April 20, 1930, another world's record was added to the aerial conquests of Colonel Charles A. Lindbergh. With Mrs. Lindbergh as co-pilot, the "Flying Colonel" took off from Los Angeles at dawn in a Lockheed-Sirius monoplane and landed 14 hours and 45 minutes later at Roosevelt Field, Long Island.

The primary object of this flight was to test the practicability of higher altitudes for commercial flying. But in accomplishing this, Col. Lindbergh also broke all previous coast-to-coast speed records . . . averaging better than 175 miles per hour.

In this flight, as in his famous trans-Atlantic flight, Col. Lindbergh relied on Thompson Valves. The 18 Thompson Valves in the Pratt & Whitney "Hornet" engine of his Lockheed-Sirius monoplane afforded the typical dependability that has given these valves world-leadership.

Utter reliability in practically all American record flights, as well as in the most grueling block tests, has influenced the adoption of Thompson Valves for today's finest airplane motors.

THOMPSON PRODUCTS, INCORPORATED
General Offices: Cleveland, Ohio, U. S. A.
Factories: CLEVELAND and DETROIT



Thompson Valves

(This advertisement is one of a series recalling historic airplane flights in which Thompson Valves were used.)

STANDARD THE SIOUX WORLD OVER

ELECTRIC BENCH GRINDERS

Needed Every Day in Every Shop!

FOR sharpening tools, for grinding, buffing, polishing, reaming, boring, and many other jobs, a Sioux Electric Bench Grinder is the handiest, speediest, most efficient and accurate machine you can have. Installed on work bench or pedestal.

No. 2000 Sioux Utility Machine has two chucks . . . a 5-inch reamer drive chuck with 3 speeds, 29 R.P.M., 46 R.P.M., and 69 R.P.M. . . . and a 5/8 inch chuck driven at motor speed, very useful for buffing, polishing, and wire brush cleaning. Guard and tool rest adjustable to size of wheel. Cut spur gears, heat treated, operating in oil. Main spindle operates on ball bearings. Ingenious braking device stops chucks and grinding wheel immediately, allowing a quick change of tools. Comes complete with a 7" x ¾" x 1" hole grinding wheel, 10 ft. cord, plug, switch, ½ H.P. motor, 60 cycle, 110-220 volt, 3450 R.P.M., or 50 cycle, 110-220 volt, 2850 R.P.M., 110 and 220 volt D. C. motors, 1 phase (2 or 3 phase if specified), net price **$165.00**

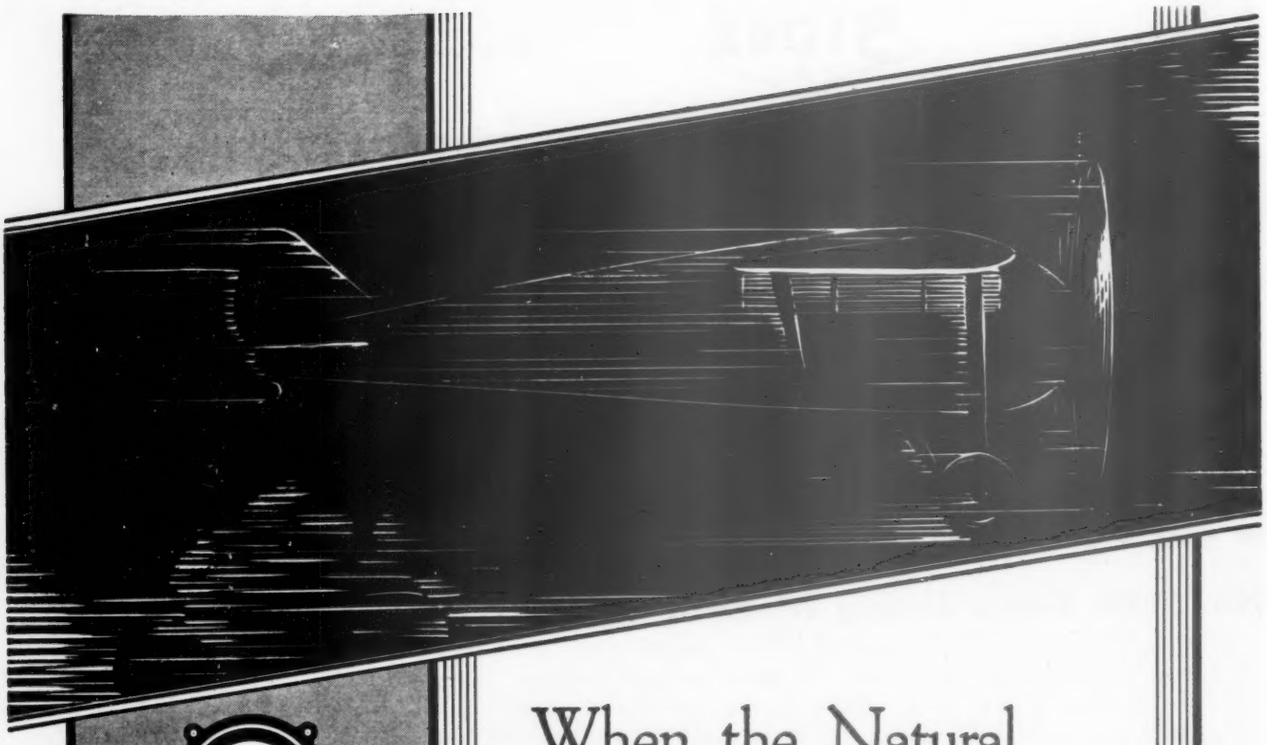
No. 2005 Sioux Bench Grinder — ball bearings throughout. Comes complete with two 6-inch grinding wheels (one coarse and one fine), adjustable tool rests, guards, 10 ft. cord, attachment plug, electric switch, ¼ H.P. motor—60 cycle 3450 R.P.M. or 50 cycle, 2850 R.P.M. 110 or 220 volt, D. C., 1 phase (2 or 3 phase if specified), net price . . **$37.50**

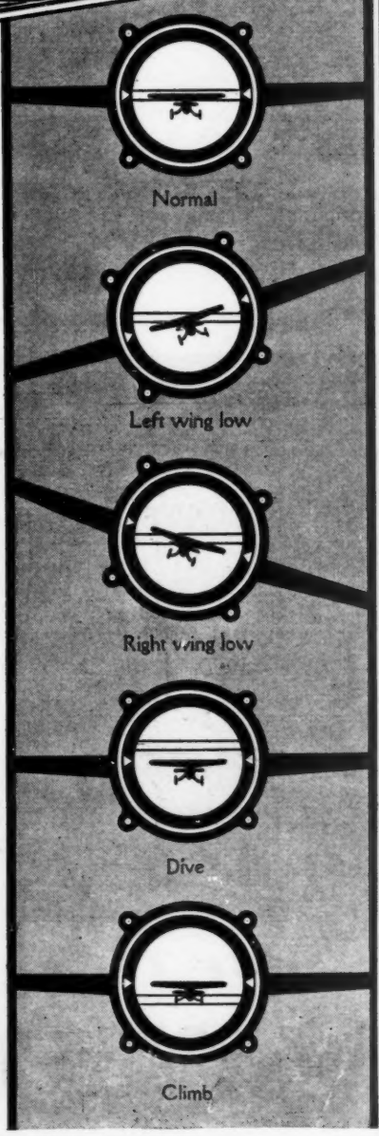
No. 2000 Utility Machine

No. 2005 Bench Grinder

Your Jobber Sells Them

ALBERTSON & CO. INC.,
SIOUX CITY, IOWA. U.S.A.





When the Natural Horizon Disappears

THE airplane has never had an *attitude indicator* for use in flight without exterior visibility. In fog, clouds, or darkness, it was impossible for the pilot to obtain an immediate picture of his wing and fuselage position. Absence of outside reference points rendered the interpretation of instrument readings extremely difficult.

The Sperry Horizon, a gyroscopic instrument, replaces with full effectiveness the obscured vision of the natural horizon. All normal flight maneuvers are performed as easily with the Sperry Horizon as with the natural horizon.

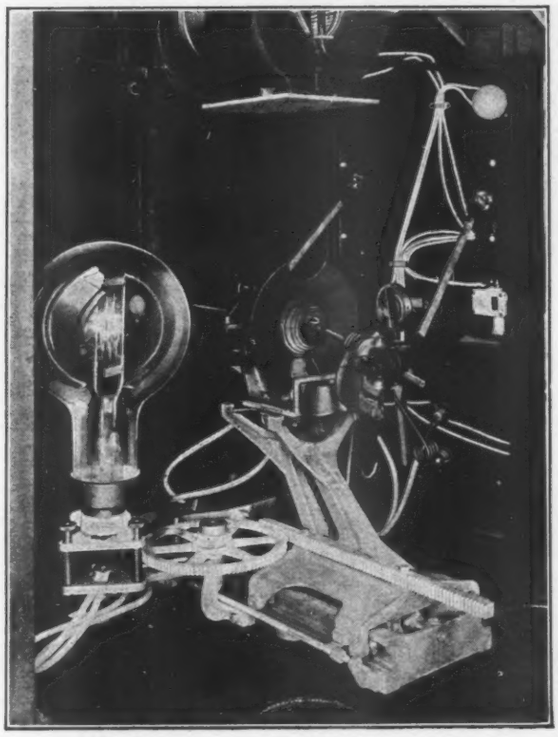
Over two hundred Sperry Horizons are in service.

SPERRY GYROSCOPE CO., Inc.

DIVISION OF NORTH AMERICAN AVIATION, Inc.

BROOKLYN NEW YORK

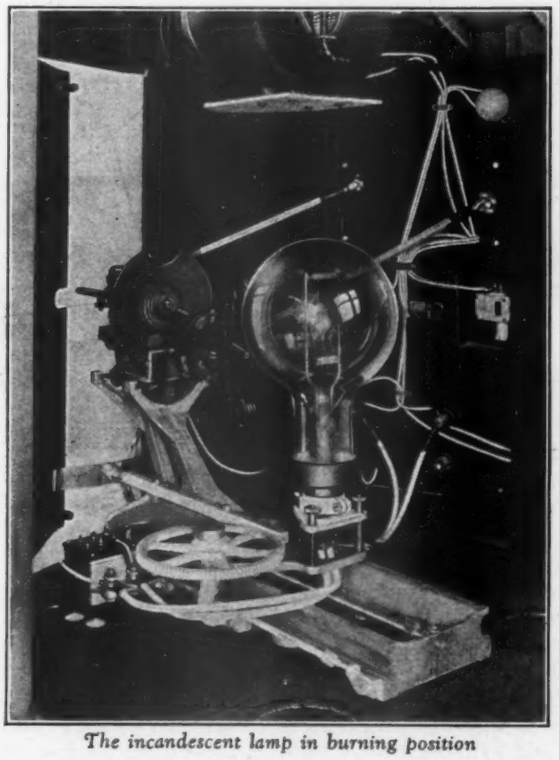
Announcing —— *the Greatest Advancement Ever Made in Landing Field Floodlighting*



The full-automatic arc in burning position

THE Sperry-AGA full-automatic arc, which has given the safest airport illumination obtainable, has been combined with the high-wattage incandescent lamp to give the highest of electrical safety—two light sources—two supply sources—two floodlights—in one. Either may be remotely controlled without the services of an attendant at the unit.

The full-automatic arc in the Sperry-AGA, 1000-mm., dioptric lens gives the greatest coverage and keeps the beam closer to the ground than any other floodlighting system. Should the arc be extinguished, or the motor generator stopped, from any cause whatever, the incandescent lamp is turned on instantly and automatically.



The incandescent lamp in burning position

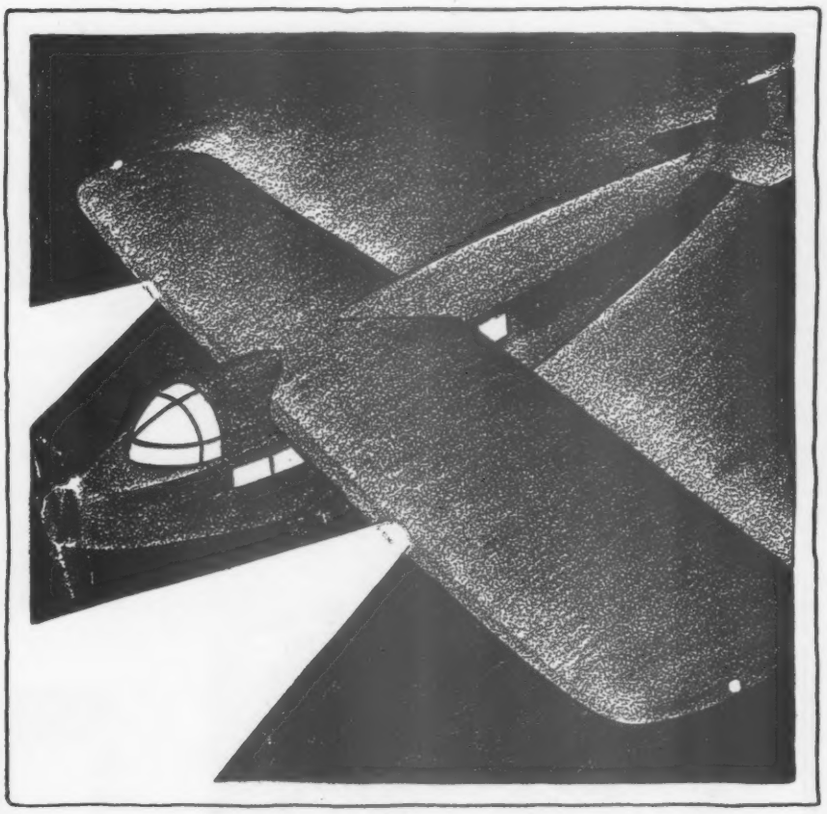
SEE THIS NEW FLOODLIGHT AT THE DETROIT SHOW IN BOOTH 106

AMERICAN GAS ACCUMULATOR COMPANY

Airport Lighting Division · Exclusive Distributor for AGA, B.B.T., and SPERRY Airport and Airway Lighting Equipment

ELIZABETH, NEW JERSEY

West Coast Representative: Sperry Gyroscope Company, Inc. · Los Angeles · San Francisco · Seattle



Are Your Planes Equipped for THE ERA OF NIGHT FLYING?

Night-flying did not have to await airplane lighting. But it was forced to await other things.

More than ten years ago Leece-Neville began to prepare for night-flying by developing suitable generators for army aircraft and special types for special services.

Now, with beacons flashing along the airways, with better lighting of airports, with night-flying as a fixed part of aviation, Leece-Neville electrical equipment offers a time-tested source of current for the lighting of planes, for the operating of radio equipment and for many other aeronautical purposes.

Years of service on aircraft in commercial, military, private and expeditionary work have proved the wisdom of developing generators for specific needs—have shown that aircraft generators must have certain features and characteristics not obtainable in ordinary automotive units.

With engines "revving" close to the top RPM, and with wide variations in the lamp load, or in the current needed for radio, heated garments, etc.,—under such conditions the generating system must insure a dependable, adequate output and, at the same time, the lamps, contacts, windings, battery and all other connected accessories must be protected against excessive rise in voltage.

Leece-Neville Voltage Regulation does this. And much MORE.

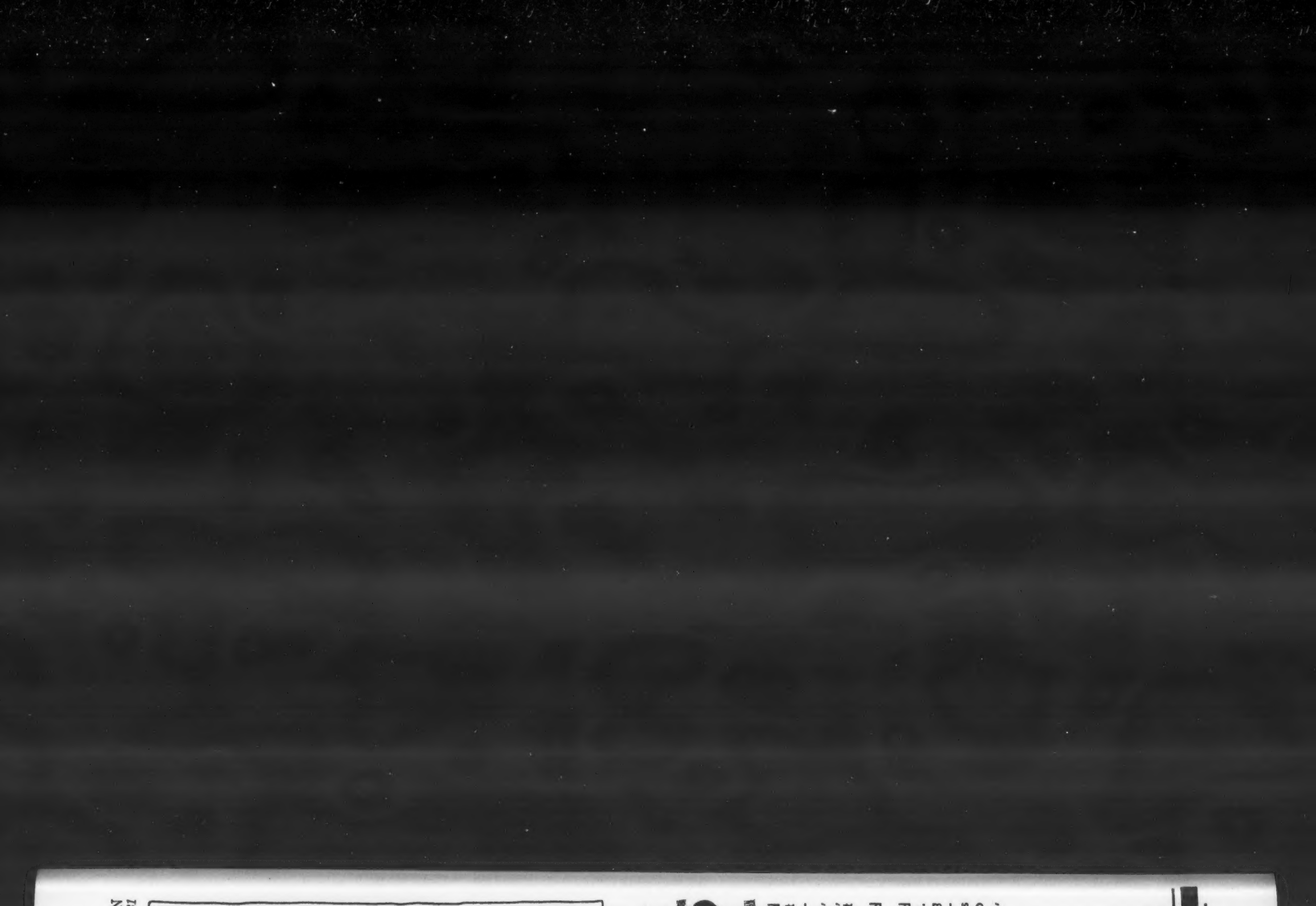
Engineers, sales managers, pilots and others are invited to see this equipment at the Detroit show, April 11-19. We will exhibit 12 to 15-volt generators delivering from 15 to 50 amperes at various RPM and a double voltage generator, giving 15 or 1,000 volts which provides suitable plate potential and filament current for radio transmitters and receivers. If you cannot visit the show, full information will be mailed on request.

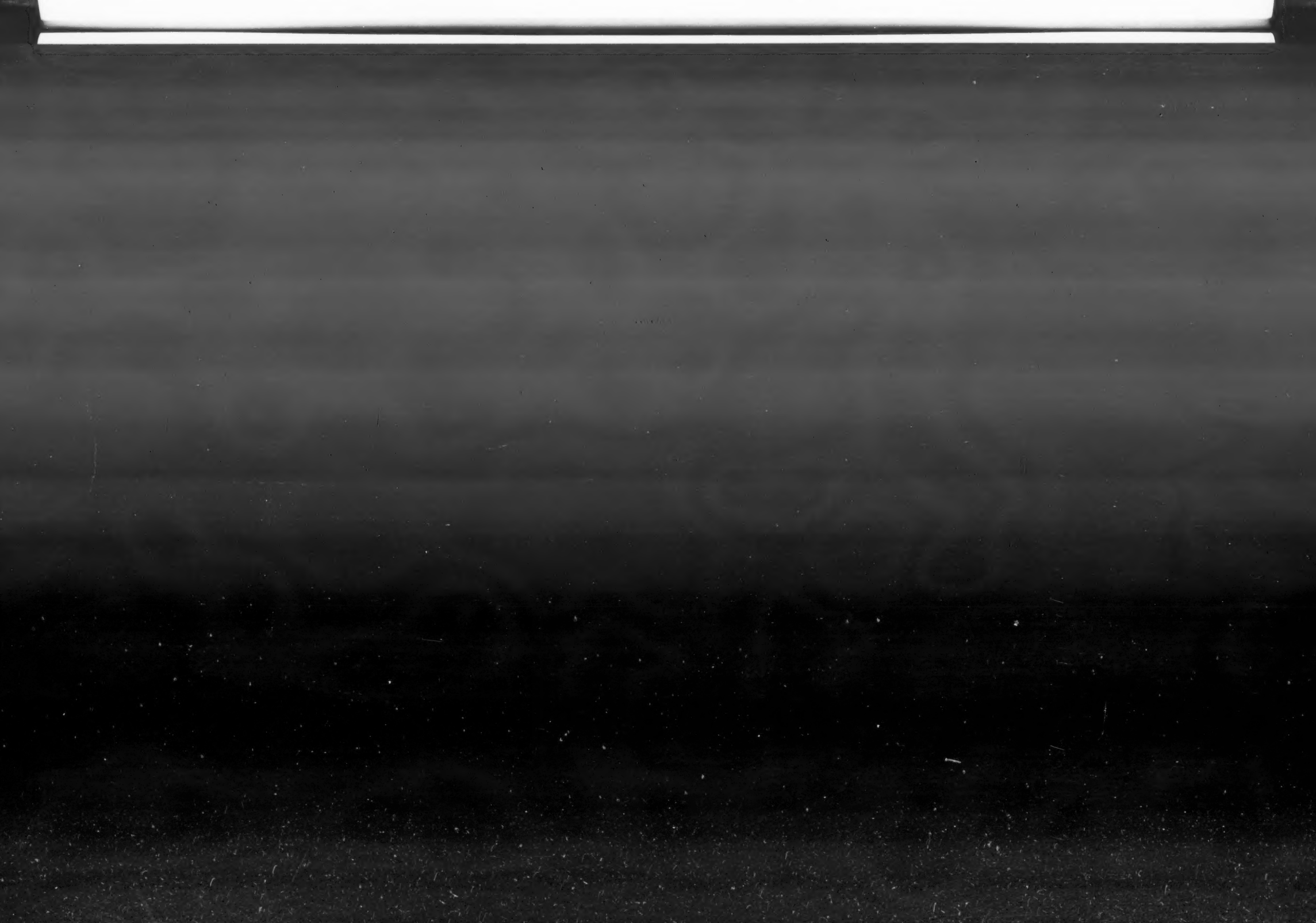
THE LEECE-NEVILLE COMPANY, 5353 Hamilton Avenue, Cleveland, Ohio

LEECE-NEVILLE

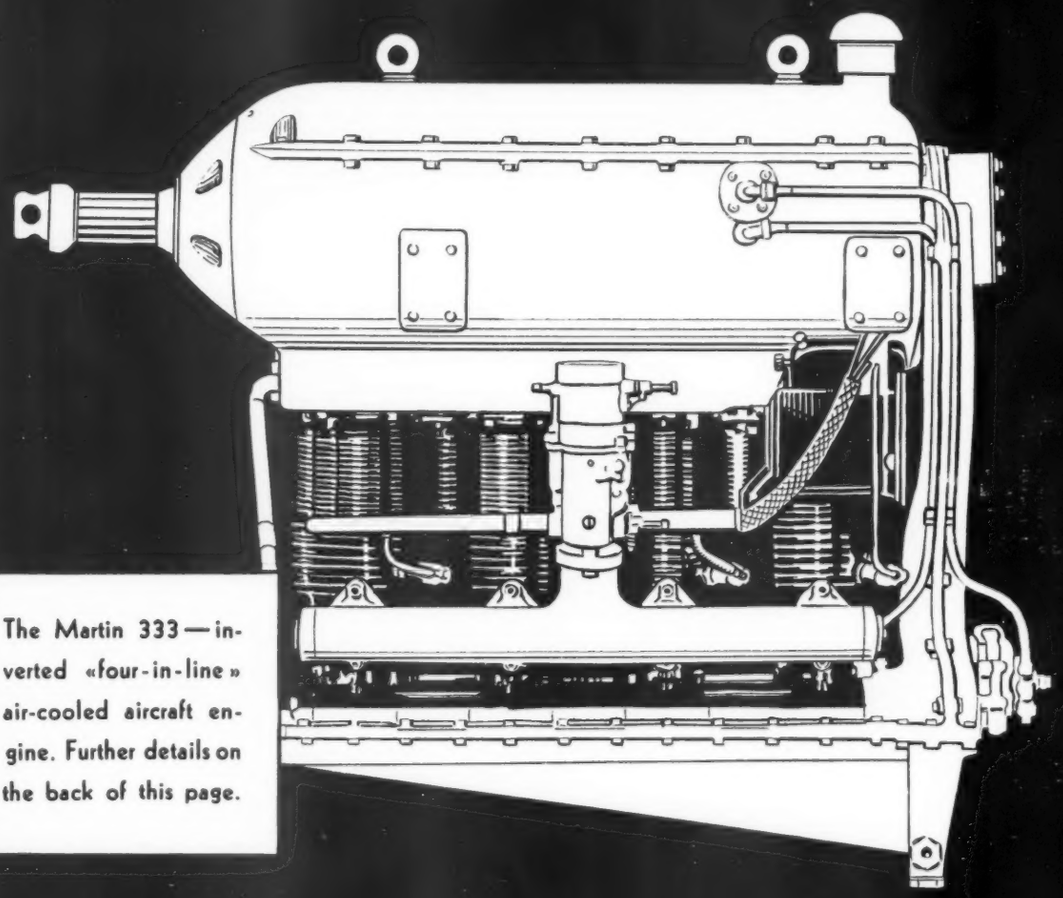
5 10 15

PATENTED VOLTAGE REGULATION





THE GLENN L. MARTIN MOTORS COMPANY



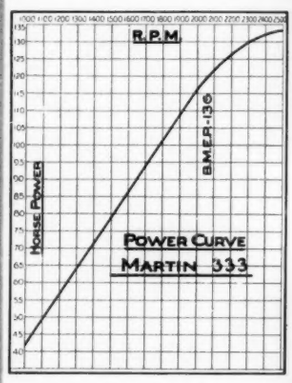
The Martin 333 — inverted «four-in-line» air-cooled aircraft engine. Further details on the back of this page.

A Subsidiary of THE GLENN L. MARTIN COMPANY

Baltimore, Maryland

EIGHT OUTSTANDING FEATURES OF THE MARTIN 333 MOTOR

Note the clean streamlining, higher propeller clearance and greater visibility of this plane equipped with the Martin 333 Motor.



Exhaust ports are located directly below the engine, so the pilot is never bothered by exhaust fumes blowing in his face.

1. Better cooling, greater visibility, higher propeller clearance, clean stream-lining—made possible by advanced "upside-down" construction.
2. Longer valve life with greater efficiency because all valve gear is kept in a constant bath of oil. No valve clearances to check and adjust.
3. Only one oiling job—putting oil in the oil tank! No rocker arms or push rods to oil and grease.
4. No hot exhaust fumes flying in the pilot's face—the exhaust ports are on the under side of the engine.
5. Unusually smooth operation and freedom from vibration, due to the application of "Balanced Design" to each individual part throughout the motor.
6. Weight per horse power app. 2.17 lbs.—120 H. P. at 2,100 r. p. m. Dry weight, app. 260 lbs.
7. Low fuel consumption—48 lbs. per B. H. P. Hr. at full horse power.
8. Extremely high brake M. E. P.—136 lbs. per square inch.

These advantages of the Martin 333 air-cooled, inverted "four-in-line" motor (A. T. C. No. 59) have attracted tremendous attention throughout the aircraft industry. On request we shall be glad to send you descriptive literature, with full information and specifications on Martin motors.

This photograph shows the increased visibility from the pilot's cock-pit of a plane equipped with a Martin 333 Motor. This advantage is made possible by the advanced "upside-down" construction of the engine.

THE GLENN L. MARTIN MOTORS COMPANY BALTIMORE, MARYLAND, U.S.A.

THE GLENN L. MARTIN MOTORS CO.

A Subsidiary of the Glenn L. Martin Company ◆ Baltimore, Maryland, U.S.A.

WANT TO ADD 200 HOURS TO YOUR MOTOR'S LIFE ?

Use the G & B Filter Funnel, like Major Coste used in fueling his famous "Question Mark"!

"Should add 200 hours to the life of a motor"—that was the estimate of an aviation authority who saw how efficiently the Filter Funnel removed dirt, sediment and other impurities from fuel.

This filter has made high-speed filtering a real thing today. In actual tests it has recovered 96% of water at 26-gallons - per - minute delivery. And *all* sediment. Neither felt, chamois nor any other medium equals it in efficiency plus speed. The biggest transport plane is fueled and away in but a few minutes.

Because of its low price, even one-ship operators can have Filter Funnel safety. Write today for report on our nation-wide field fueling tests with the G & B Filter Funnel.

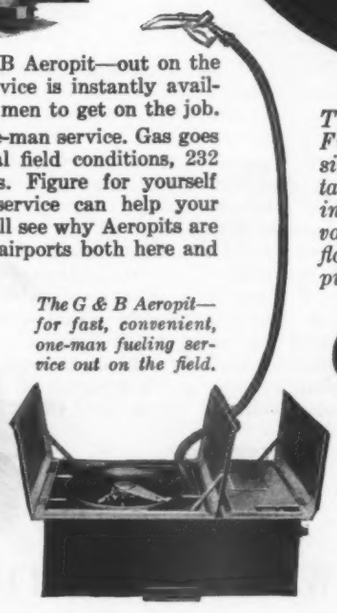
The Gilbert & Barker Filter Funnel—handy, simple in design. You can take it apart and clean it in three minutes. Shut-off valve prevents gas overflowing onto hot exhaust pipes.

This transport plane loses no time waiting for fuel

It's fueled at a G & B Aeropit—out on the flying line where service is instantly available. No waiting for men to get on the job.

Aeropit service is one-man service. Gas goes in fast. Under actual field conditions, 232 gallons in 9 minutes. Figure for yourself how that kind of service can help your flight schedule. You'll see why Aeropits are now used at leading airports both here and abroad. The G & B Aeropit has been expressly designed for airport needs. Sets flush with the ground, reducing field hazards. Motor unit is in hangar for easy control. The whole unit is built to give years of dependable service.

Send for special Aeropit Bulletin.



The G & B Aeropit—for fast, convenient, one-man fueling service out on the field.

GILBERT AND BARKER
MANUFACTURING COMPANY
SPRINGFIELD, MASS., U. S. A.
GASOLINE AND OIL FUELING EQUIPMENT
G&B

BG

MICA AVIATION SPARK PLUGS

(Patented in the United States and Other Countries.)

Considered from the only standpoint that is really important, that of superior and uniform service, B. G. Mica Aviation Spark Plugs are *highest* in flying safety and *lowest* in service cost. They are made of the best materials throughout, insulated with selected mica which is the only insulating material that will withstand mechanical abuse and meet all the demands of modern aviation engines. They are wrought by specialists, every one of whom is a craftsman at his particular bench. Severe testing and meticulous inspection prove the high uniform quality of every plug. Unremitting efforts to improve an already *good* product—constant striving to make a *better* plug—have resulted in the unquestioned leadership of B.G. throughout the entire aviation industry.

B. G. Eliminates Ignition Interference

This new B. G. radio shielded spark plug—in conjunction with shielded magnetos and harness—eliminates all ignition interference, keeps out dirt, water and oil and gives positive contact. It is insulated with mica—the superior insulating material. It has standard shell and core hexes, is easily serviced with standard B. G. tools, and can be assembled to harness without solder. Terminal connections fit any make of shielded harness, and are interchangeable on all B.G. radio shielded plugs. The threaded elbow terminal prevents short-bend wear and tear on harness and provides quick accessibility. Made in types for supercharged and super-compressed engines to meet idling or full throttle conditions.

THE B. G.

136 WEST 52nd STREET,

CABLE ADDRESS: GOLSTECO, NEW YORK

B. G. Hornet Spark Plugs

There is a B. G. Hornet Spark Plug to fit every make of air-cooled and water-cooled engine. The latest plugs are the 3B-1; 4B-1; and 5B-1 models. These cover the entire range of operation from the highly super-charged engines to cold weather idling conditions in standard engines. The improved design and construction of each of these plugs gives increased electrode life and enlarges the range of operation.

B. G. 1XA and 1XB Spark Plugs

There are four different types of B. G. Spark Plugs with one inch hex. They are the 1XA Regular; 1XA Extra Gap; 1XB Regular; and 1XB Extra Gap. These plugs are used with unusual success in almost all standard types of engines. The Extra Gap models are the same as the Regular models except for the extra gap which is built into the terminals. The Extra Gap type is preferred by many users because there is greater resistance to fouling under certain excessive oil conditions.

The Choice of Those Who Know

B. G.'s are the best known spark plugs in aviation. For years they have been the choice of those who realize that safety in flying depends as much on perfected spark plug performance as on any other factor. For this reason, in 1930, as in many previous years, B. G. plugs were used in practically every outstanding aviation event. B.G.'s have stood the test, proved their worth and deserve their popularity. That's why they are used by such leading companies as American Airways; Boeing Air Transport; Colonial Air Transport; Eastern Air Transport, Inc.; National Air Transport; National Parks Airway; New York-Philadelphia and Washington Airway Corporation; Northwestern Airways; Pacific Air Transport, Inc.; Pan-American Airways; Pennsylvania Air Lines; Southern Air Transport; Transcontinental and Western Air, Inc.; Thompson Aeronautical Corporation; United States Airways; Universal Air Lines, Inc.; Varney Air Lines, and others.

CORPORATION

NEW YORK, N. Y.

CONTRACTORS TO THE UNITED STATES ARMY AND NAVY

GILMORE OIL PRODUCTS
MONARCH OF ALL

GILMORE AGAIN!

GILMORE SURFACING
USED ON
LINDBERGH FIELD SAN DIEGO, CALIFORNIA.

WHEREVER progressive principals of airport construction and operation are employed, there you will find take off runways and landing areas surfaced by Gilmore Methods with Gilmore special Asphaltic petroleum products.

Gilmore surfaced airports are models of economy and safety. That is why Gilmore products were used in the surfacing of the new Lindbergh Field at San Diego, California.

Air transport companies, private flying field owners and municipal authorities can obtain facts on practical airport surfacing by addressing Gilmore Oil Company, 2423 East 28th Street, Los Angeles, California.

GILMORE
SPECIAL ASPHALTIC
AIRPORT OILS

1260-A

HERE'S A GREAT TEAM

WHEN YOU BUY
A NEW SHIP
SPECIFY
GOODYEAR
AIRWHEELS

FOR SAFER FLYING

THE Goodyear Airwheel—and the new Goodyear Airwheel roller-bearing brake—that's a combination to save gray hairs for flying men.

These great big soft rubber cushions called Airwheels make safe landings on plowed ground, sand, or in swampy pastures—and it's a whale of a comfort to know you can make such landings when you have to.

More than that, Airwheels with the new roller-bearing brakes can "stop on a dime."

With these powerful, smooth-working, sure-releasing new brakes, quick stops bring new safety.

You can slide the wheels—or bring up the tail—depending on the landing surface—and *still keep complete control.*

You can hold a ship at a standstill with full throttle—release the brake—stop the ship again. That's *power.*

Only Goodyear can give you this safety. Only Goodyear builds Airwheels and Airwheel brakes.

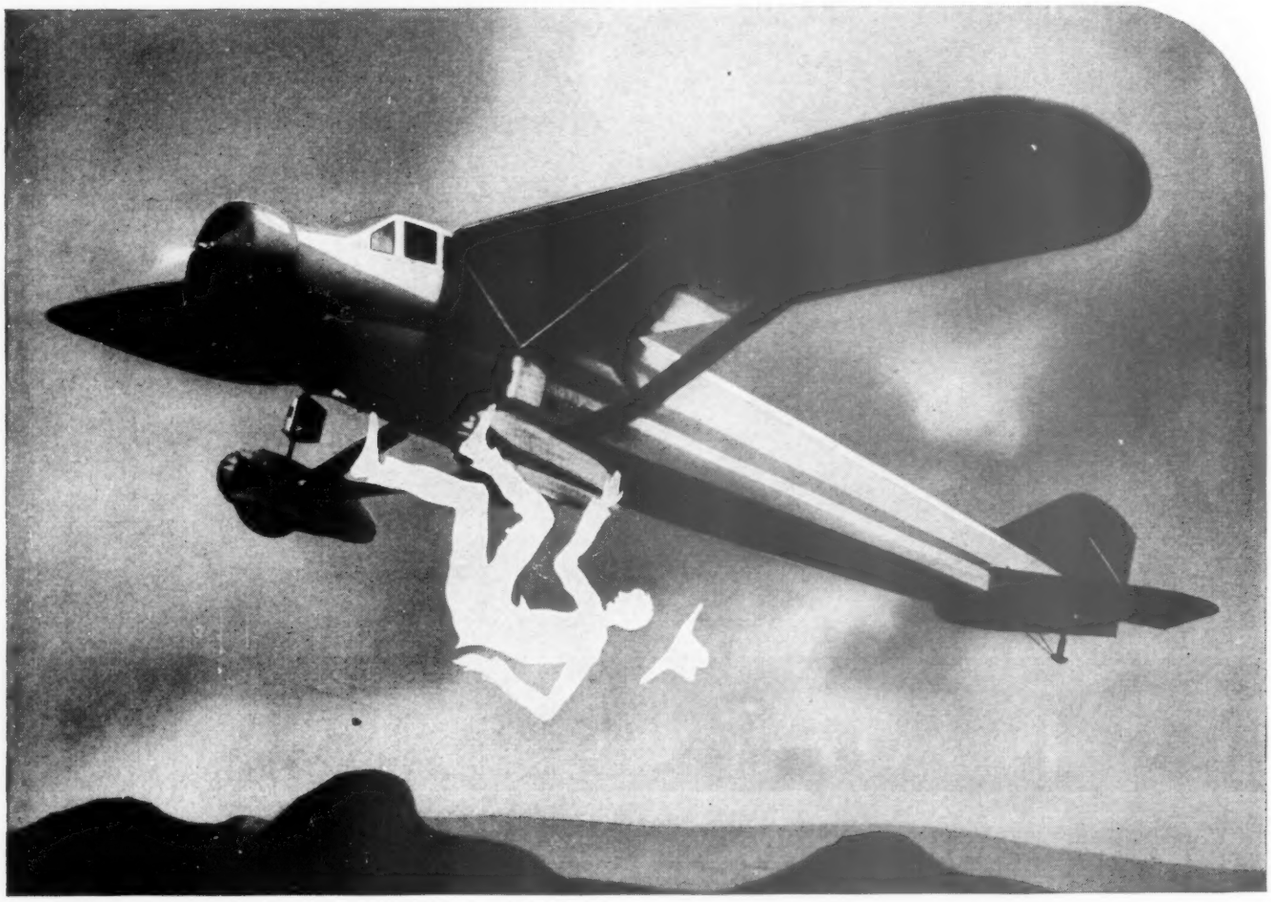
Don't take the air with anything short of Goodyear protection.

For full engineering data, write or wire Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.

GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

HE WANTS TO RIDE . . HE REFUSES TO PAY . . THROW MR. WATER-THIN OUT OF YOUR PLANES!



MR. WATER-THIN not only refuses to pay—he costs you money! For Mr. Water-thin is that quart or more of thin, waste oil that ordinary refining leaves in every gallon of motor oil. It's stuff so lacking in body, so quick to vaporize under heat, so useless in a plane motor, that Quaker State engineers have dubbed it "water-thin".

And they've done more than give it a name. They've found a way to throw it out. They've developed and installed in every one of Quaker State's modern refineries special equipment that removes water-thin—and replaces it with rich, full-bodied lubricant.

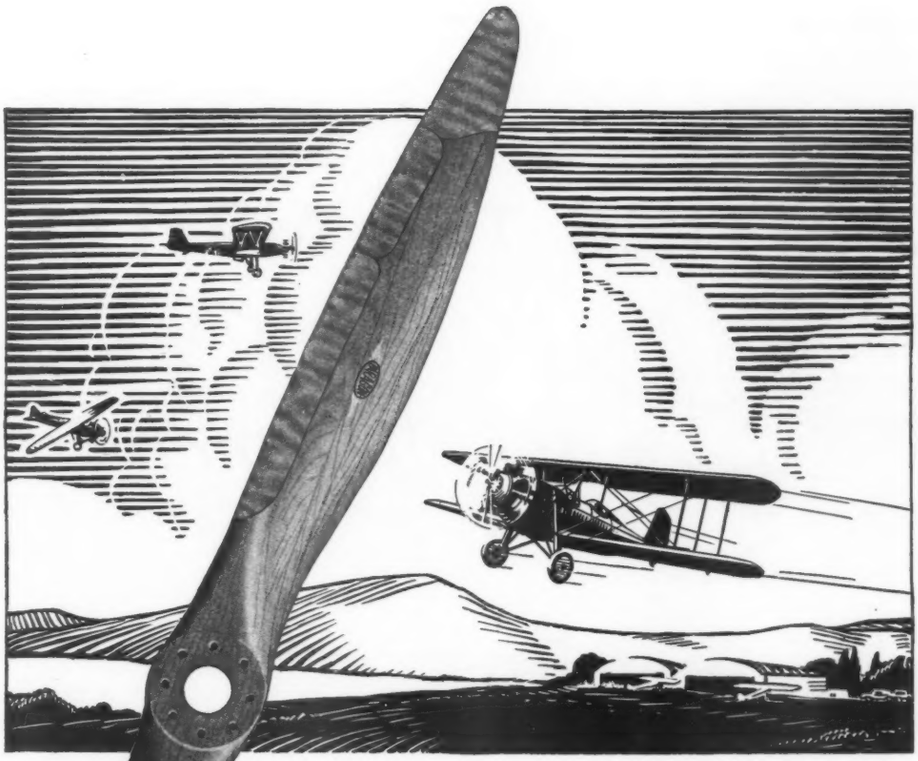
So Quaker State Aero Oil is *all* lubricant. It's four full quarts of lubricant to the gallon, instead of three quarts and one of waste. There's really an *extra* quart of lubrication in every gallon of Quaker State! Small wonder Quaker State is good for far more hours in the air. *Small wonder Quaker State is the world's largest selling Pennsylvania Oil!*

And Quaker State is made entirely from 100% pure Pennsylvania Grade Crude Oil. It is so free from impurities that it doesn't require acid treatment in refining. That's important! For acids tend to destroy some of an oil's oiliness.

Use Quaker State Aero Oil in your planes. Learn what a difference it will make—in operating cost—in extra margin of safety. Learn what that extra quart of lubrication can mean to motor—and pocketbooks!

QUAKER STATE
TRADE-MARKS REG. U.S. PAT. OFF.
MOTOR OIL

THERE'S AN EXTRA QUART
OF LUBRICATION IN EVERY GALLON



Two reasons—both good— LIGHT WEIGHT—LOW COST *—for using wood propellers*

The name Paragon assures absolute rightness of design, materials, careful workmanship and strict maintenance of rigid standards.

For smaller popular-priced ships, and for extremely large ones using geared engines, use Paragons.

Competent engineering counsel concerning Paragon's standardized models is instantly available.

AMERICAN PROPELLER COMPANY

(Division of Bendix Aviation Corporation)

SOUTH BEND -:- INDIANA

DISTRIBUTORS

Air-Associates, Inc., Roosevelt Field, Long Island, N. Y. and Municipal Airport, Chicago, Illinois.

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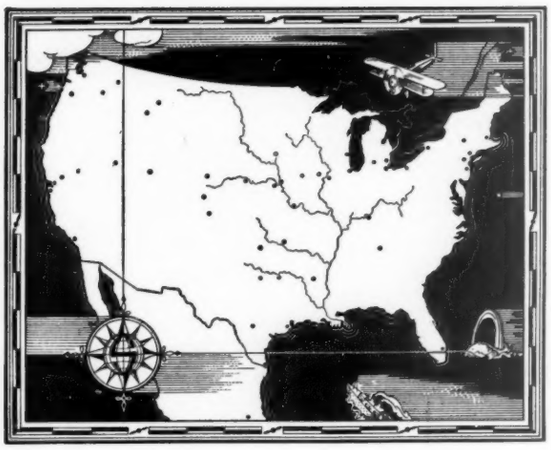
DOTTING THE AIR-LANES

are home ports—

for Stearmans—



Home ports.....nation-wide.....where skilled hands .....men familiar with Stearmans are at the service of Stearman owners. This marks a new era in flying .....Stearman points the way..... Any good ship—flown as much and as far as Stearman (air-mail, business, sport) obviously needs these nation-wide facilities.....Owners have a right to expect it.....Keen buyers know this.....that's why you'll be seeing more Stearmans in the air. STEARMAN AIRCRAFT COMPANY, WICHITA, KANSAS.....Division of United Aircraft and Transport Corp.

Junior Speedmail 300 and 400 H. P.
....Business Speedster 240 H. P.

STEARMAN

For every flying reason

PHILADELPHIA Can Help You

In solving the problems now confronting so many industries, many firms would do well to begin with a check-up of their present plant locations.

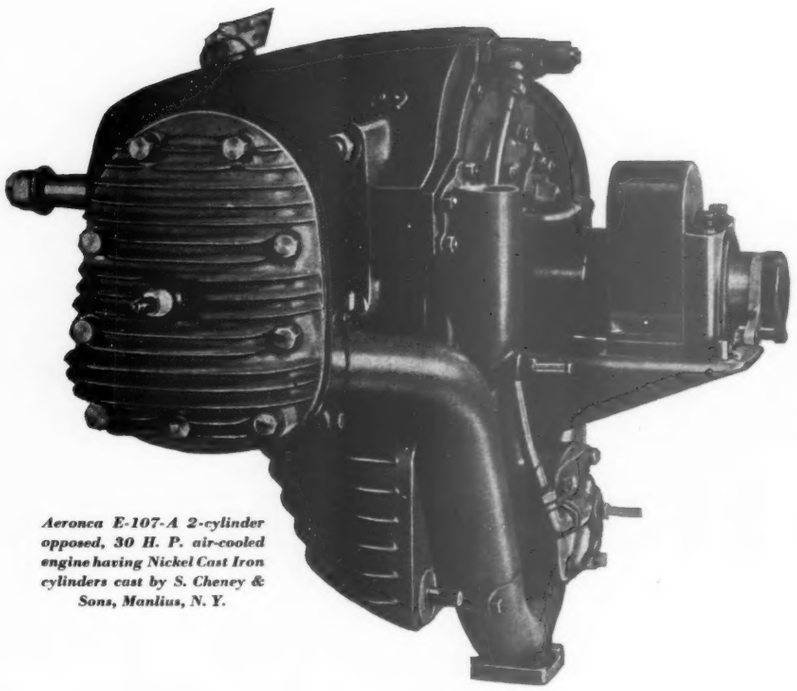
If Philadelphia can help you improve your business by means of a better location for it, this Association will ascertain that fact for you without putting you to any expense or placing you under any obligation. If it develops that a location in the Philadelphia area would afford no worth while advantages for your business, when compared with its present, or other contemplated locations, this Association will tell you so.

Our engineers weigh every factor in relation to its effect on the *delivered-to-customer cost.*

If desired, your interest in this subject can be handled as a confidential matter, the survey being prepared under an assigned number, and your identity being known only to the executive heads of this Association.

Send for booklet, "A Dollar-and-Cents Viewpoint on Plant Location," which tells in detail the important things you should consider in plant location. Please address Department B.C. on your business letterhead.

PHILADELPHIA
Business Progress Association
1442 Widener Building, Philadelphia



Aeronca E-107-A 2-cylinder opposed, 30 H. P. air-cooled engine having Nickel Cast Iron cylinders cast by S. Cheney & Sons, Manlius, N. Y.

AERONCA E-107-A ENGINE CYLINDERS *are* NICKEL CAST IRON.... *"the longest wearing cylinder material known today"*

● Small, compact, carefully designed and built, the 2-cylinder 30 H.P. air-cooled Aeronca E-107-A airplane engine has demonstrated what properly selected materials can do to insure dependable performance. Nickel Cast Iron, called the "longest wearing cylinder material known today" is used for cylinders of this economical power plant designed for lighter type airplanes. "The remarkable success of the Aeronca C-2 airplane would never have been possible without the Aeronca E-107-A motor", states Mr. H. Eichhammer, sales promotion manager of the Aeronautical Corporation of America, Cincinnati, Ohio. ● Approximately eighteen well known airplane engines have Nickel Cast Iron cylinders. This scientifically correct material is strong and dense throughout and, due to its high uniform hardness assures exceptional wear-resistance along cylinder bores.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

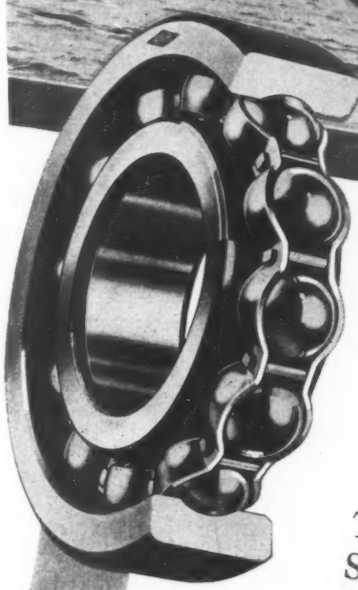
Miners, refiners and rollers of Nickel... Sole producers of Monel Metal

INCO NICKEL

Our casting specialists will gladly discuss your problems with you.

Nickel CAST IRON

A BETTER MATERIAL FOR MODERN NEEDS



SRB . . . . . and SIKORSKY

The Sikorsky S-38 Amphibion is still another SRB air accomplishment. A proud one, too, for the name "Sikorsky" is now legend of reliable, critically engineered aircraft. Two 420 horsepower Wasps — famous aircraft engines by Pratt & Whitney—furnish an abundance of power. SRB Ball Bearings are used at important bearing points.

Strength, compactness and endurance—herein lies the reason for SRB dependability. These and other attributes enable SRB Ball Bearings to reduce wear, save power and lengthen the life of any mechanism into which they are installed. You will find them equally serviceable in your own product—why not get all the facts?

STANDARD STEEL AND BEARINGS INCORPORATED
Plainville *Connecticut*
DIVISION OF MARLIN-ROCKWELL CORPORATION

Ball SRB Bearings

THIS WAY TO SALES!

PRIVATEER

LOWEST PRICED AMPHIBION IN THE WORLD

$5,800 . . . . . *Government Approved*

In "PRIVATEER", lowest priced Government Approved amphibion in the world, Amphibions, Inc. presents to dealers a ship designed and priced to please that great group of buyers who are looking for the dual convenience of dependable amphibion performance at minimum cost.

Designed by pioneer makers of amphibions . . . rugged of construction . . . easy to control and service . . . test-flown under every conceivable flying and landing condition . . . the two place open cockpit "PRIVATEER" is the only ship that fits the needs of this great group. Hence, in his territory, the "PRIVATEER" dealer has an unchallenged entry into a vast, untouched market with splendid opportunities for immediate and future profits.

The Amphibions, Inc. dealer policy is fair and liberal. Amphibions, Inc., territorial rights offer unlimited possibilities for present and future business. From those interested in securing a valuable territorial appointment, Amphibions, Inc. invites an investigation of its policies and of "PRIVATEER" performance. For complete information, write or wire

AMPHIBIONS, INC.

GARDEN CITY, NEW YORK

See the "PRIVATEER" at the National Aircraft Show, Detroit, for Details and Demonstration

The Hahn *Radio-Shielded* Spark Plug

NOW there is a new radio-shielded spark plug with operating characteristics even better than ordinary plugs. In service the Hahn Plug frequently runs without adjustment for more than 300 flying hours. It runs without fouling in hot or cold engines and without preignition at any spark setting up to 40° spark advance. Already the Hahn Plug has been adopted by the Radio Corporation of America, Eastern Air Transport, Colonial Air Transport, Southern Air Transport and Embry-Riddle. If you are interested in radio shielding or just improving engine performance, you will do well to investigate this new plug. Write for full details.

Visit our Display at the Detroit Air Show.

Announcing

A New Spark Plug . . . and A New Fire Extinguisher

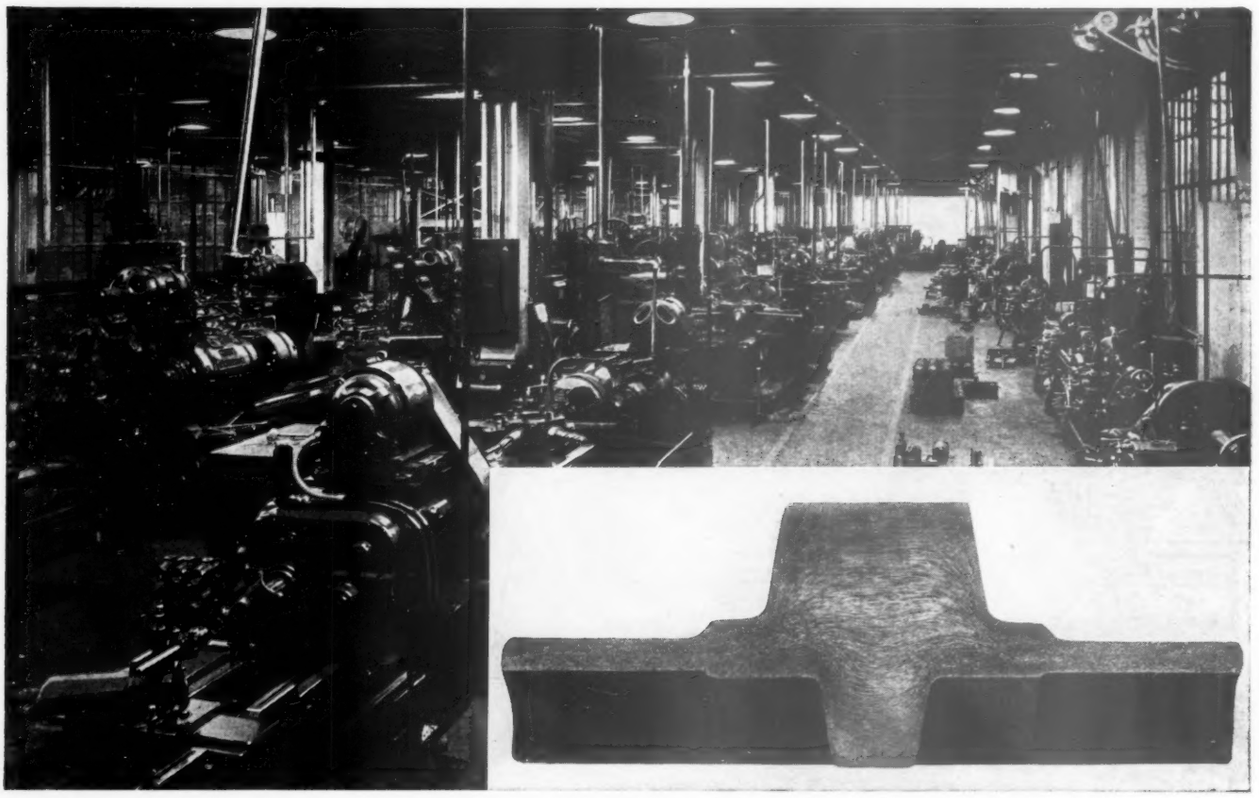
The LUX Extinguisher for Fires on Aircraft Engines

FLAMES in the air have met their master. The new Lux Extinguisher snuffs out engine fires on the ground or aloft instantly. It envelops the entire engine in a cloud of non-combustion-supporting carbon dioxide gas. Lux gas, harmless to plane and pilot, is immediately effective, even against fire is running gasoline. 250 Navy airplanes are being equipped with the new Lux Extinguisher. Ford, Sikorsky, Fairchild, Great Lakes, Keystone, Douglas, Glenn Martin and Stinson have installed it on many of their ships. For tests have proved the Lux Extinguisher the only device effective in a slipstream. Investigate the remarkable protection that the Lux Extinguisher brings to a plane, its pilot and passengers. Full information upon request.

Visit our Display at the Detroit Air Show.

The Lux Extinguisher consists of a special light weight cylinder of gas (to the right), tubing to distribute the gas about engine (above) and a control mounted on the instrument panel.

Walter Kidde & Company Inc., 140 Cedar Street, New York



Some idea of the completeness of Hamilton Standard machine tool equipment can be gained from the main illustration. Insert shows a hub section, indicating grain flow which gives these forgings maximum strength.

PROPELLER HUBS OF . . .

PROVEN DEPENDABILITY

The propeller hub is one of the most highly stressed parts in the entire airplane. In the interest of *dependability*, its design must represent the most intelligent compromise between the opposing requirements of lightness and strength.

Electric furnace steel from Timken and Central Alloy, produced in closely-controlled small heats, tells the story of steel quality. Forging, and subsequent heat-treatment by Canton Drop Forging & Manufacturing Company, pioneers in grain flow for exacting requirements, insures the development of the full strength of the forging —especially against fatigue stresses.

Precision machining and rigid final inspection in our own specially equipped shops complete the story of how Hamilton Standard propeller hubs are constructed to meet all of the exacting demands of flight—with a large factor of safety.

HAMILTON STANDARD PROPELLER CORPORATION

PITTSBURGH, PENNSYLVANIA

HAMILTON STANDARD PITTSBURGH PENNSYLVANIA PROPELLER CORPORATION

DIVISION OF UNITED AIRCRAFT AND TRANSPORT CORPORATION

Marcel Doret's world's record Dewoitine plane displayed at the Paris Aviation Salon. His 500 h.p. Hispano Suiza engine was equipped with Champion Aero A spark plugs when he broke the world's record for 1000 kilometres (625 miles) at 178¾ miles per hour.

Now every engine becomes a better engine

CHAMPION AERO TYPE spark plugs are gaining wider acceptance for aircraft engines every day simply because with a set installed every engine becomes a better engine.

No other aircraft spark plug combines the performance capacity and the unqualified dependability of the specially designed, specially constructed Champion Aero Type.

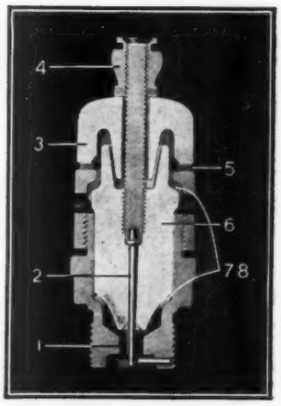
They afford practical immunity from pre-ignition and fouling.

The exclusive Champion sillimanite insulators (not porcelain) are so designed that the primary is protected by the secondary "dome" insulator, *positively preventing interference with engine operation,* in the remote possibility of breakage.

Because of this new factor of safety for aircraft engines, Champions are enjoying a rapidly growing demand from transport lines, mail lines, racing flyers and private owners alike.

Install a set of Champion Aero Type spark plugs in your plane today. They are the ready means of making every aircraft engine a better engine. Better in performance. Better in dependability. That is why Champion Spark Plugs for all engines, excel and outsell the world over.

Concentration on this one type spark plug for practically all aircraft engines enables Champion, through large production, to offer this vastly superior spark plug at the extremely low price of $1.25.



Champion Aero A Exclusive Features

1. Restricted bore. 2. Special analysis electrode. 3. Secondary sillimanite dome insulator. 4. Welded steel terminal. 5. Copper seal. 6. Primary sillimanite insulator. 7-8. Molded copper gasket seals.

New Improved

CHAMPION

Spark Plugs for Aviation

TOLEDO, OHIO **WINDSOR, ONT.**

Advancing RAPIDLY by Right Fundamentals

Aviation, as an industry, gives renewed evidence of its great present and greater future in the National Aircraft Show at Detroit, April 11th to 19th.

Conspicuous among the notable exhibits at this impressive aircraft exposition is the masterful group of Great Lakes airplanes.

The Great Lakes Sport Trainer is an outstanding example of the country wide popular following that an airplane can create for itself, when it embodies a truly advanced conception of airplane production.

The Great Lakes Sport Trainer is the product of a thoroughly organized and modernly equipped plant. It is designed and engineered according to the latest principles of aerodynamics. And it is built with consummate craftsmanship, under the most rigid of supervisory and inspection systems.

GREAT LAKES AIRCRAFT CORPORATION
Contractors to the United States Army and Navy
CLEVELAND

If you attend the show be sure to see this ace of Great Lakes craft. If you do not reach the show, write today for the complete data on the Great Lakes Sport Trainer for 1931 and you will have some of the best news the show affords.

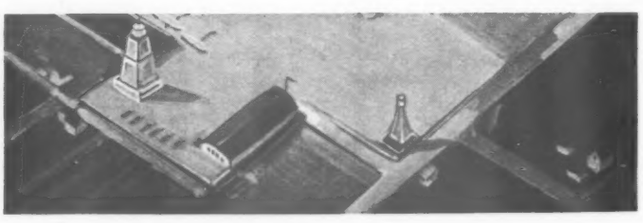


Photo by R. B. Hoyt

. . . with SOCONY

GIVE 'ER THE GUN . . . she's on the "step"! That's all there's to it when you use a fuel you can depend on—a fuel with plenty of ready power like Socony Aviation Gasoline.

Whether you pilot a seaplane, a land-plane, or an amphibian, you can always depend on Socony Aviation Gasoline and the New Socony Motor Oil for a care-free take-off. Use them next time and convince yourself.

SOCONY

Socony Aviation Gasoline **New Socony Motor Oil**

STANDARD OIL COMPANY OF NEW YORK

The Famous
SWITLIK
SAFETY CHUTES
Now Only
$300
FOR WHITE SILK

and

$240
FOR PONGEE SILK

Pilots:—Here is the greatest value in Aviation today. A proved superior SWITLIK SAFETY CHUTE (with the famous patented combination pack cover and pilot chute) at a saving of $75.00. Here is the chute that is smaller, lighter, more compact, perfectly smooth, really comfortable to wear, and of proved quicker opening—at a lower price than you would pay for an ordinary chute. Every SWITLIK CHUTE is drop tested and approved with A: T. C. Wire or write at once.

SEE THE SWITLIK SAFETY CHUTE EXHIBITED AT THE NATIONAL AIRCRAFT SHOW, DETROIT

Department of Commerce Officials—Air Mail Pilots and Famous Flyers use Switlik Chutes

SWITLIK PARACHUTE & EQUIPMENT CO.
BROAD & DYE STREETS TRENTON, N. J.

WESTERN MANAGER—BERT WHITE—1223 AIRWAY—GRAND CENTRAL AIR TERMINAL—GLENDALE, CAL.

BELOW: *Oakland, California, U. S. Airways Radio Station, Department of Commerce.*

SAFEGUARDING THE NATION'S AIRWAYS WITH UP-TO-THE-MINUTE WEATHER INFORMATION FLASHED BY

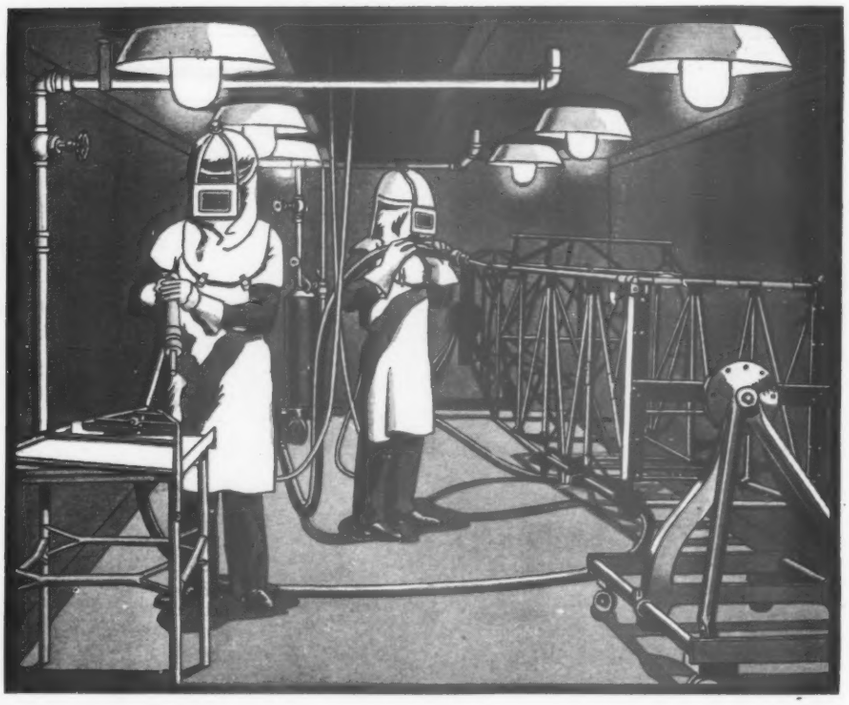
TELETYPEWRITER SERVICE

ONE of the important duties of the Airways Division of the United States Department of Commerce is to furnish air transport interests with complete information as to weather conditions along the routes they are flying. To this end, weather reporting stations are maintained throughout the country by the U. S. Weather Bureau, in co-operation with the Department of Commerce. Messages between the stations are exchanged instantly and accurately by Teletypewriter Service.

Some seventeen circuits are used to connect these weather reporting stations. Every hour the weather observer at a terminus of each circuit types out a report of meteorological conditions in his vicinity. This report is identically reproduced at the same moment in each station along that circuit. As the first report is concluded, the next observer types his data and so on until the last one has reported.

In this way weather conditions along the airways are made known to pilots before they take off for distant airports. This information, so essential in air navigation, is also broadcast to planes in flight by the Airways Radio Stations of the Department of Commerce. Even the most remote and isolated stations along the routes, situated on mountain tops or in desert areas, are continuously in touch one with another, just as though "under one roof."

Commercial organizations also find Teletypewriters valuable for co-ordinating the activities of separated offices. Your local Bell Telephone Company will be glad to discuss with you how this modern communication aid can be of service to your company.

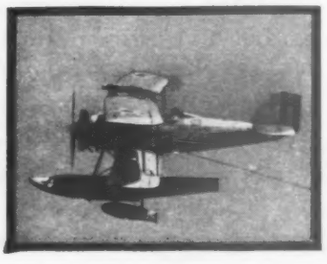


BUILDING CHANCE VOUGHT STAMINA INTO AIRPLANES

Metal parts on Chance Vought airplanes hold their finish. No landings in rough salt water—no dives through soaking clouds of rain—no penetrating fogs break through to start corrosion. Perched high on the exposed decks of Navy ships at sea, Vought planes are well protected against the lash of wind-blown spray.

Before the three protective coats of red oxide and enamel go on, the metal parts are cleaned and surfaced in the sandblasting room. Clouds of fine, sharp grains with a lusty pressure of air behind them remove every vestige of dirt and grease, producing a surface to which the finish hangs on through the toughest kind of service.

In the modern, sunlit Vought plant at East Hartford, you'll find the latest equipment and processes. And you will discover many ingenious methods and mechanisms which are as characteristically Vought as the ships themselves. Chance Vought Corporation, East Hartford, Connecticut. Division of United Aircraft & Transport Corporation.



SEE THE VOUGHT EXHIBITION SPACE 121-133, NATIONAL AIRCRAFT SHOW, DETROIT

CHANCE VOUGHT CORPORATION

and *PRESTO!* —*it spouts a rod of fiery red*

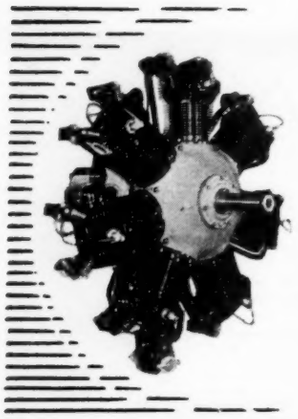
You are in the great Morgan Rod Mill of the Roebling plant. Only a handful of men are present. Yet, here is a veritable beehive of activity—and before your eyes is performed a feat of modern industrial magic.

Here, with almost unbelievable swiftness, machines of super-human skill and accuracy transform billets of steel into glowing coils of snake-like rod. Two inches by two and 28 feet long, a square billet is fed into the furnace at one end of the mill—and presto! it is spouted out at the other end, a round rod about 700 feet long and in any desired diameter from .200″ to .360″.

In making Roebling Aircraft Wire, Strand and Cord the most modern of production facilities are employed in every process. To insure the exceptional quality and uniformity for which they are noted, no stone has been left unturned.

JOHN A. ROEBLING'S SONS COMPANY
WIRE . . . WIRE ROPE . . . WELDING WIRE . . . FLAT WIRE
COPPER *and* INSULATED WIRES AND CABLES
WIRE CLOTH *and* WIRE NETTING
TRENTON, N. J. *Branches in Principal Cities*

ROEBLING WIRE AIRCRAFT PRODUCTS



● *See our Exhibit of Warner Scarab 5 and 7 Cylinder Engines at the National Aircraft Show in Detroit April 11th to 19th.*

An Eye to the Future!

IN AN industry such as ours where constant change has been the order and the only certainty has been uncertainty, there is always the temptation to do the thing that at the moment appears to be expedient—to take the quick profit and forget the long haul ahead.

But, with an eye single to the future, Warner has been rearing its structure on firmer ground.

For we at Warner know that there is a glorious day ahead for the Aircraft Industry.

When that day dawns, Warner will be in line for the rewards that come to the true pioneer, who builds not for the profits of the moment but for those more enduring assets of customer-good will and product excellence.

Though one of the most conservative engine builders in the entire industry, nevertheless some of the most sensational records have been made by Warner Scarab Engines.

For Warner has time and again demonstrated that it will outperform any power-plant of comparable horsepower rating on the market.

As a result, the painstaking care and skill, the knowledge of design and fabrication that enters into Warner Scarab construction has received recognition by those who buy on the record of past performance and not on mere expectations.

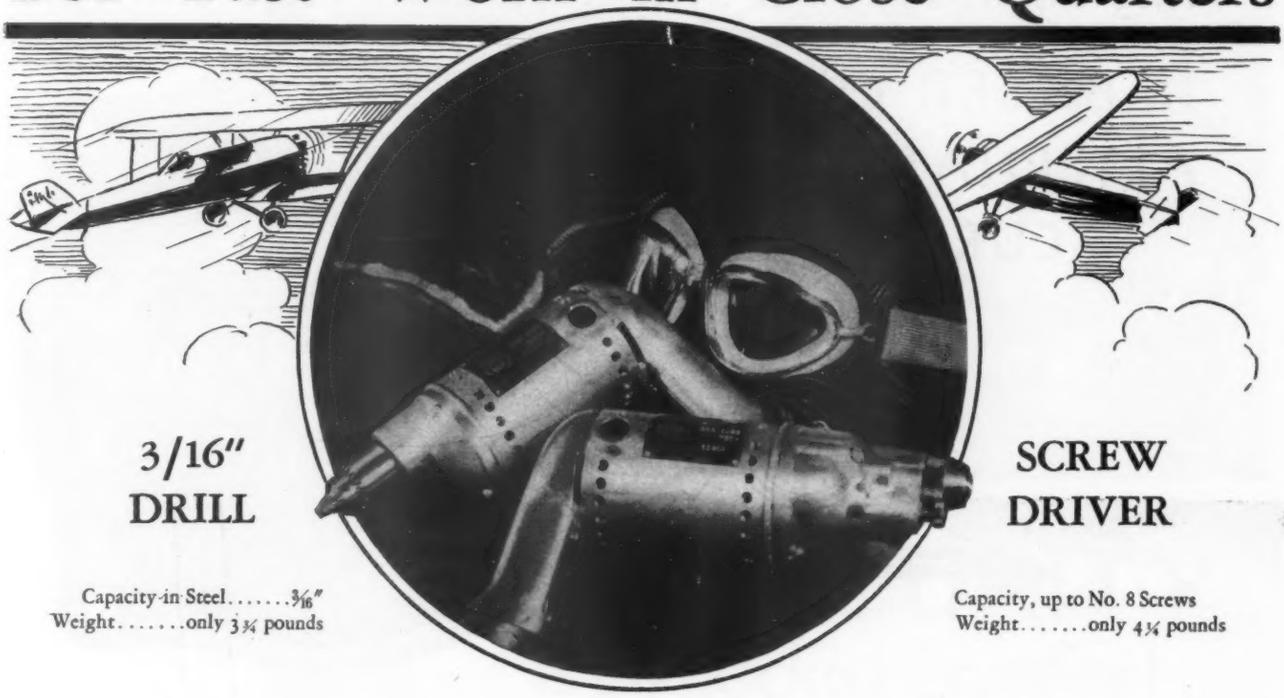
The number of Warner Scarab Engines in the hands of those best qualified to judge is one of the strongest sales presentations Warner has to offer.

WARNER AIRCRAFT CORPORATION
DETROIT, MICHIGAN

WARNER "*Scarab*" ENGINES

The NEW UNIVERSAL TWINS

For Fast Work in Close Quarters



3/16" DRILL

Capacity in Steel.....3/16"
Weight.....only 3¼ pounds

SCREW DRIVER

Capacity, up to No. 8 Screws
Weight.....only 4¼ pounds

SMALL in size, light in weight, powerful in operation, the new Black & Decker Universal Twins are designed to do their work with great ease and speed, even in close quarters Small body diameters and rounded exterior surfaces fit the tools to the hand and afford the operators easy grasp in any position. With them your operators can do tedious production or maintenance work in less time, at less cost.

The Screwdriver has an adjustable friction clutch which drives the screw "flush" and releases immediately without danger of marring the screwhead or surrounding surface. Driving tension can be conveniently set with the knurled thumb screw on the gear case. When necessary, the bit can be given an extra turn by a mere pressure of the finger on the clutch control. In addition, this screwdriver has a positive clutch which allows the spindle to remain idle for finding slot in screw, and immediately engages the bit when pressure is exerted. This new unit is ideal for the many light screwdriving applications in airplane assembly and trim work.

The drill is fitted with a 3/16" key-operated chuck. Like its companion, the screwdriver, it has all the features found in the larger Black & Decker Drills. Powerful Universal Motor operates on A. C. or D. C. Ball Bearings on Armature shaft and spindle. Furnished for 110, 220 or 250 volts. This drill is particularly applicable to the requirements of the aviation industry.

See these Time and Labor Saving tools at Your Distributor's—or mail the coupon below for further details of these and other Black & Decker Tools for Aircraft Production and Maintenance

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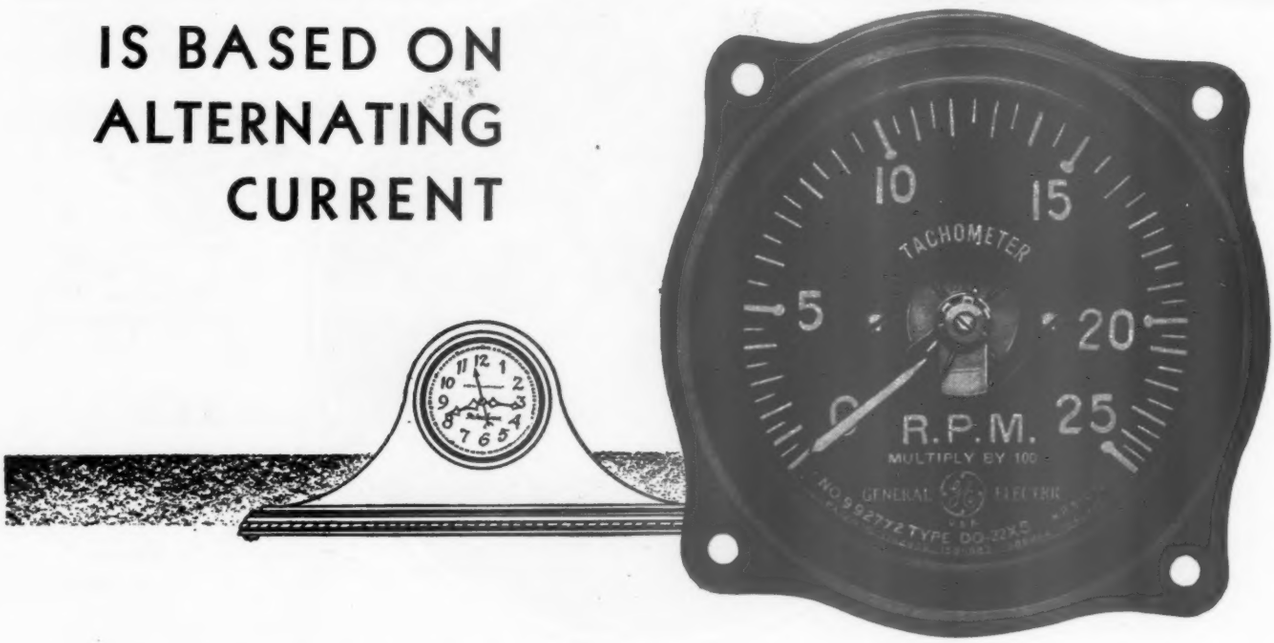
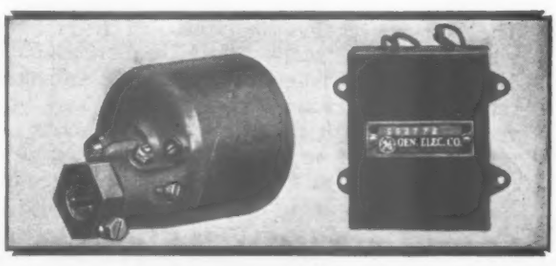
... like accuracy in a synchronous electric clock...

IS BASED ON ALTERNATING CURRENT



THE indications of the General Electric tachometer for aircraft engines depend on the frequency of the alternating current produced by a small generator. This generator has no commutator and no brushes; it replaces the conventional tachometer drive shaft on the engine and produces a pulsating current that is always in synchronism with the speed of the engine. The indicating instrument measures the frequency of the pulsations in terms of rpm., through the medium of a small transformer, so that fluctuations in voltage do not affect its accuracy. Let us send you complete information. Address General Electric Company, Schenectady, New York.



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AËRONAUTIC EQUIPMENT

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SPECIALISTS IN NEW YORK, WASHINGTON, DAYTON, AND LOS ANGELES

A SENSE OF SECURITY
is an added comfort

The luxurious interiors of planes, their Pullman-like appointments and the application of every known safety device have all contributed their share to the ever-increasing popularity of air travel in this country.

But crowd-control at landing fields is just as important as a safety factor. If crack pilots are unnerved by a crowded field, what feelings must the unexperienced air-traveler suffer.

Many transport operators have solved this problem by enclosing the promenades and parking areas with Anchor Fences, thereby insuring a clear field for landing planes. An Anchor Fenced field sighted by a passenger gives him a sense of security, which is truly a real added comfort.

An Anchor Fence doing crowd-control duty during the landing of Coste's plane.

ANCHOR POST FENCE COMPANY
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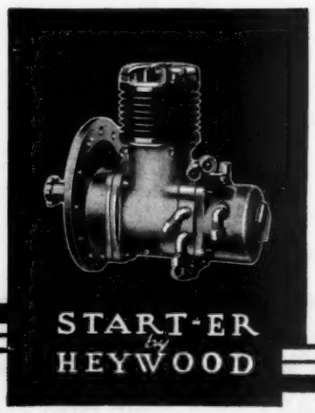
ANCHOR FENCES

MADE BY THE MAKERS OF AMERICA'S FIRST CHAIN LINK FENCE

FIRST *Commercial Auto-Giro in the United States, manufactured by* PITCAIRN AIRCRAFT INC., *is* HEYWOOD EQUIPPED

HEYWOOD STARTERS

SKY SERVICE



The Detroit News Autogiro is the first commercial plane of this type in the United States. In keeping with the other features of great safety and convenience incorporated in the Autogiro, Pitcairn has equipped this plane with a Heywood Starter.

In no other aircraft in the world is stability, safety and convenience so combined as in the Autogiro and in no other starter are these vital factors so easily apparent.

Dependable at all times, under all climatic conditions —a touch on the starter button brings instant response and assures a quick, easy start from the pilot's seat.

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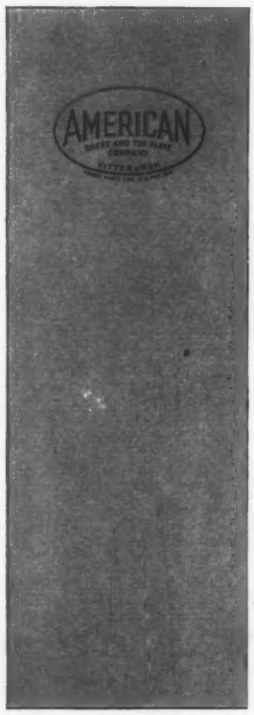
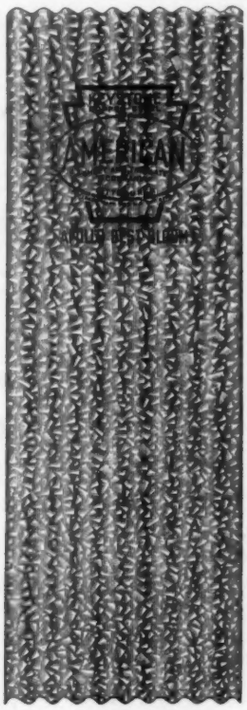
BLUE ANNEALED — BLACK — GALVANIZED — AND RUST-RESISTING COPPER STEEL





IN growing fields of aviation, AMERICAN Steel Sheets are called upon to meet exacting and important service—because these Sheets are dependable and meet qualifications that are necessarily strict.

KEYSTONE Quality (steel alloyed with copper) is unexcelled for all outside uses. Culverts of this material make drier, safer landing fields. Hangars, shops, and sheds of KEYSTONE Quality are strong, fireproof and durable—and for all other uses in construction or equipment to which sheet metal is suitable, there AMERICAN Sheets excel and render excellent service.

AMERICAN products include a complete line of Steel Sheets and Tin Plates for all known uses. These products have long been the choice of railroads, automobile makers, and construction interests—and now command favor in the aviation field.

Supplied in Black and Galvanized Sheets, Full Finished Sheets, Formed Roofing and Siding Products, and Special Sheets for special purposes; also Tin and Terne Plates. Sold by leading metal merchants. Write for interesting booklets and information.

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ALL THE WORLD SENDS STUDENTS TO AMERICA'S UNIVERSITY OF THE AIR

LOOK at these men! Fine upstanding fellows—Parks men—part of the student body of America's University of the Air. They are men you'd like. You'd be happy among them learning to fly, preparing to take your place in Aviation's big forward sweep of 1931.

Parks students come from every state in the Union and from 14 countries in addition to the United States. Those from abroad usually come with the approval of their governments, after inspection of this school by representatives.

Parks Air College is today the world's largest and most respected commercial flying school—outstanding in high standards, in thorough instruction, in caliber of executives, faculty, and student body. A Parks diploma is the finest endorsement you can take with you into the aviation industry.

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Are you going into aviation determined to make good, and ready to work for your success? For men of vision and grit, there's only one school—Parks! "Skyward Ho" tells you all about it. Send the coupon for this interesting book.

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by the feeder line

MORE feeder lines are starting in operation this spring than ever before. For there are real possibilities in them and in charter and taxi work at your airport, provided a wise choice is made of planes.

And it has been proved in cold, black figures that the profitable ship for this kind of work is the Fokker Super-Universal. It is economical to operate, sturdy, speedy and durable.

Powered by a Pratt & Whitney 425 h.p. "Wasp" engine; six passenger seats and baggage or lavatory room.

The Super-Universal is in profitable use by many of the most successful lines, such as Western Canadian Airways, Mid-Continent Airways, Dixie Flying Service, Southern Air Transport and National Parks Airways.

A Limited Number of Real Bargains

We have on hand certain Super-Universals and other Fokker planes that have been used as *demonstrators* —at bargain prices. The list includes:

STANDARD UNIVERSAL	F-10A TRIMOTOR
SUPER-UNIVERSAL	F-11A AMPHIBIAN
F-14A MAIL PLANE	F-32

These airplanes are in splendid mechanical condition; "new" in appearance and are fully guaranteed by us. The number is limited but while they last, they represent exceptional profit opportunities.

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FOKKER AIRCRAFT CORPORATION OF AMERICA. GENERAL MOTORS BUILDING. NEW YORK

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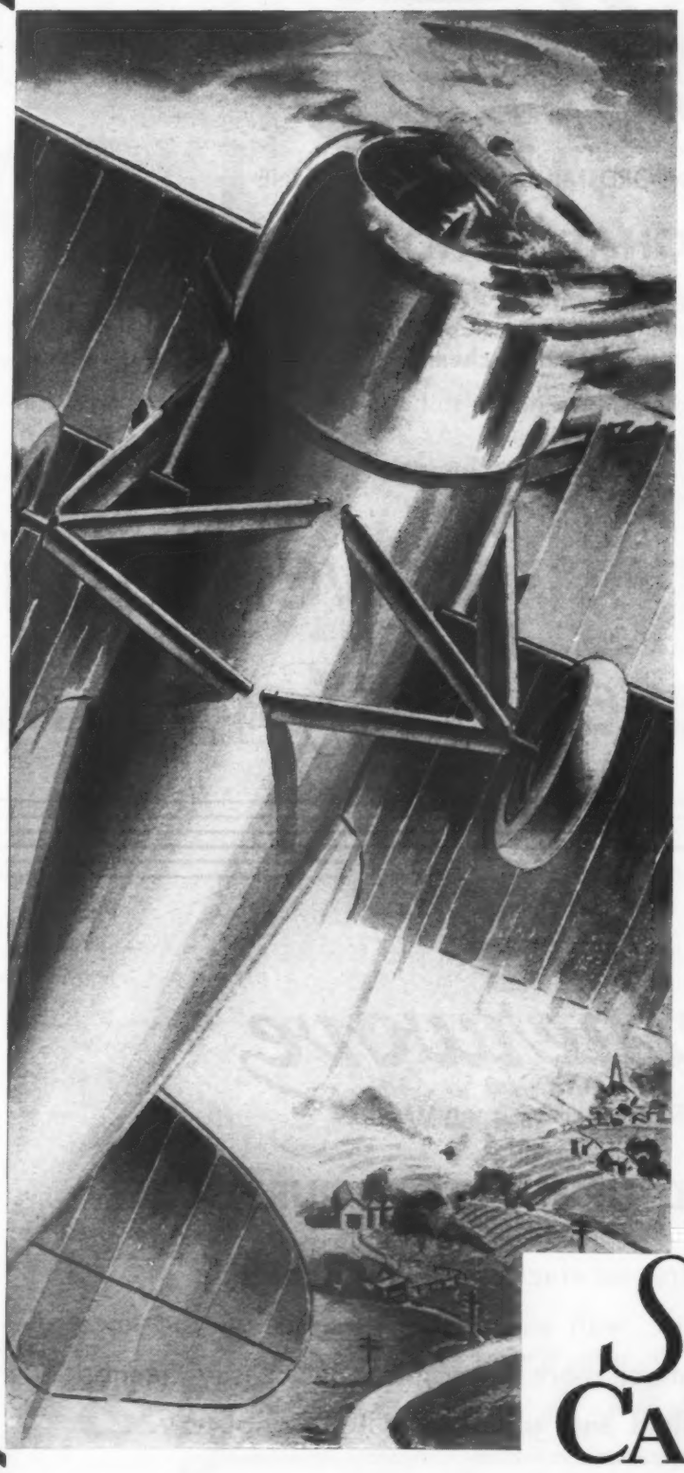
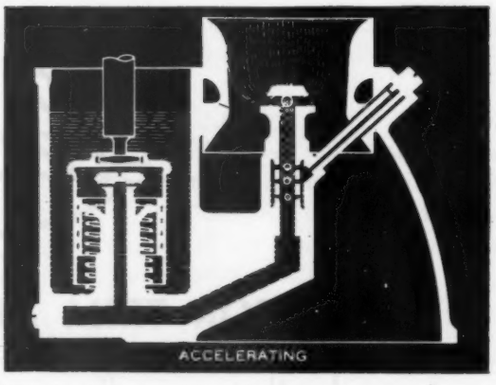


WHEN a pilot opens the throttle quickly, he wants smooth and positive acceleration. It is his greatest factor of safety in many tight situations.

Temporary enrichment of mixture required for such acceleration is automatic with Stromberg Aircraft Carburetors. That's why so many good pilots prefer them. The accelerating pump, for use on engines which require a large accelerating charge for cold weather operation, is a new and exclusive Stromberg construction. It gives a positive and definite accelerating charge, under all conditions, regardless of the situation existing in the carburetor. This charge is delivered in a momentary spurt of fuel followed by a sustained discharge, lasting several seconds.

Stromberg's background represents 22 years of experience and research. Perhaps their engineers can be of service to you.

Stromberg Carburetors are used on over 95% of the aircraft engines now being built in the United States.



STROMBERG CARBURETORS

BENDIX STROMBERG CARBURETOR COMPANY

«DIVISION OF BENDIX AVIATION CORPORATION»

701 BENDIX DRIVE • SOUTH BEND, INDIANA

CHASE

Velmo

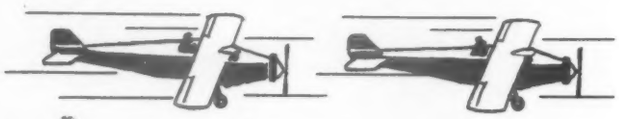
MADE BY SANFORD MILLS, SANFORD, MAINE

THE DE LUXE MOHAIR UPHOLSTERY FABRIC

Velmo affords positive non-slipping riding ease . . . A rich, luxurious surface that retains its smart appearance through continuous hard service . . . Colors and tones so varied that there is a Velmo upholstery to blend with every decorative scheme.

Velmo is easily renovated at low cost . . . practically soil and wear proof and has great durability without excessive weight.

.....aircraft travel fabrics by Chase



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Leatherwove

Made by
SANFORD MILLS, SANFORD MAINE

FOR TRIM AND UPHOLSTERY PURPOSES

Leatherwove offers a very satisfactory leather substitute . . . . a strong, wear-resisting fabric with all the appearances of the finest grades of leather, though much more economical. It is easily cleaned; comes in a variety of colors and grains to match upholstery.

L. C. CHASE & COMPANY, SELLING AGENTS, BOSTON
New York Detroit San Francisco Chicago

MONOCOUPE for 1931 is the Year's Outstanding Development

ONLY THE TEST OF TIME BRINGS OUT THESE FACTS

See It at
THE DETROIT SHOW

More pilots have won prize money for speed and efficiency with MONOCOUPES than any other airplane.

More MONOCOUPES are flown by strictly private owners and amateur pilots than any other two place plane.

MONOCOUPES offer more features of comfort, high performance combined with economical maintenance than found in any other airplane at any price.

Although MONOCOUPE imitators have failed to equal MONOCOUPE performance the important trend in modern design is indicated by this imitation.

MORE MONOCOUPES have been sold in 1931 todate than in the same period of any other previous year. The financial backing of the MONOCOUPE has never been greater at any time nor its dealer organization stronger.

The Monocoupe "90"

Registered Trade Mark

"90" -- "110" and "125"

Monocoupe Models for 1931 Lead in Performance Comfort and Low Operating Cost

MONOCOUPE for 1931 is the Year's Outstanding Development

The Monocoupe

Registered Trade Mark

"90"	Lambert R-266 Engine. Fly-away Field, Moline.	$3,375.00
"110"	Warner 7-cylinder Engine. Fly-away field, Moline	$4,750.00
"125"	Kinner B-5 Engine. Fly-away field, Moline.	$4,750.00

TO SEE IT IS TO WANT IT

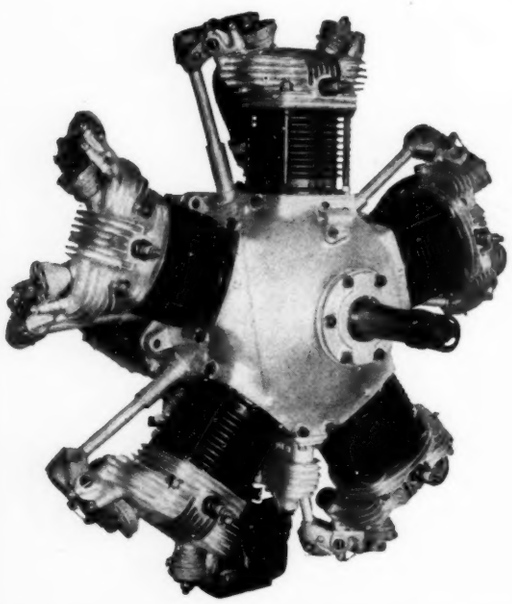
The Monocoupe "90" (See Illustration on preceding page.) Its comfort, beauty and general dependability, plus efficient performance, make this plane highly desirable for private or professional flyers.

The cabin interior is a revelation. Not a detail has been overlooked. Wide seat with room to spare for two occupants. Soft cushions, formed back rests. Rudder pedals adjustable—wheel brakes actuated by pilot's heels—Dual control stick and pedals. Instruments complete of highest quality. Fuel capacity for over 5 hours flying at 100 M. P. H. A demonstration flight with any Monocoupe dealer will convince you of the superior merits of the Monocoupe.

For Those Who Seek Fast, Comfortable Travel for Long Distances

The Monocoupe "110" (See Illustration above.) Due to the increased H. P. this plane has even more remarkable performance than the "90" series. During the 1930 National Air Races this Monocoupe "110" established an official speed record 3.84 M. P. H. faster than the Army pursuit planes of nearly three times the horse power. Many of the country's celebrated pilots own the Monocoupe "110" for their personal use.

Extremely high performance, a cruising speed of 120 M. P. H. Easy to fly, designed for the novice as well as the professional pilot. Here indeed is a plane that affords all one would expect.



The Monocoupe "125" is another DeLuxe model, the same in every detail as the "110" except for the engine. In this plane we install the 125 H. P. five-cylinder Kinner B-5 engine. Choice between the two planes depends entirely upon the purchaser's preference of engine. The performance with Warner or Kinner engines is almost identical.

The Lambert R 266 -- 90 H. P. Engine

TO FLY WITHOUT EXTRAVAGANCE, to give the American Public a chance to do this; to produce a real airplane that the man of moderate means can afford to fly as he drives his car, but without the costs until now of a powerful, reliable engine, the Lambert Model R-266 Engine has been developed. At a moderate cost and minimum expense for upkeep, it furnishes a reserve of power capable of giving the small sport plane a performance of which its owner can well be proud.

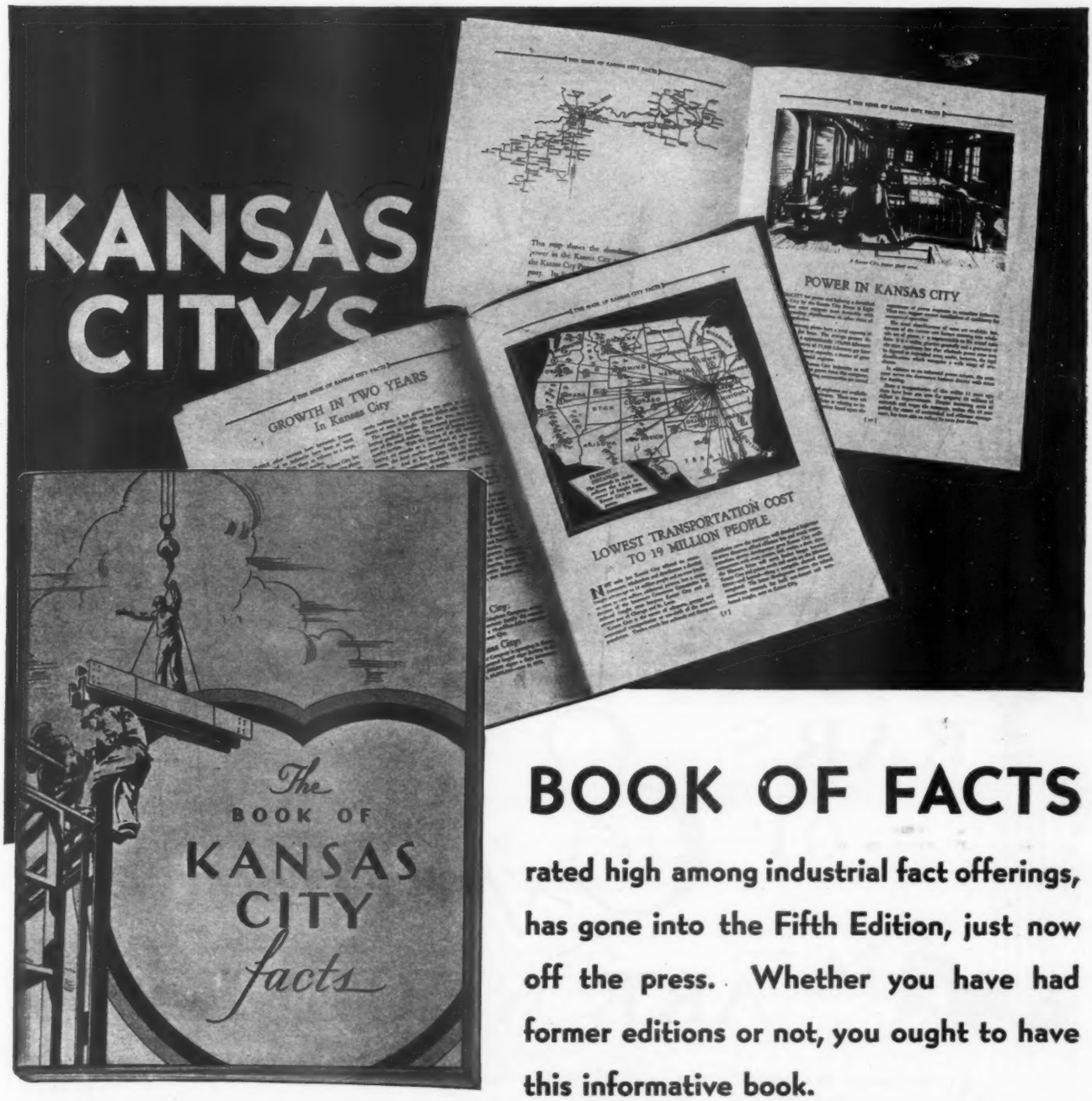
The short stroke gives high engine speed with low piston travel, making possible the use of the new efficient small diameter propellers.

Send for Complete Information and Specifications

MONO AIRCRAFT CORPORATION

MOLINE, ILLINOIS, U. S. A.

Monocoupe Models for 1931 Lead in Performance Comfort and Low Operating Cost



BOOK OF FACTS

rated high among industrial fact offerings, has gone into the Fifth Edition, just now off the press. Whether you have had former editions or not, you ought to have this informative book.

INDUSTRIAL COMMITTEE OF THE CHAMBER OF COMMERCE OF

KANSAS CITY

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Industrial Committee, Chamber of Commerce, Kansas City, Mo.
Please send me the Book of Kansas City Facts. I am interested in the _____ industry.

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Address _____

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(I saw your advertisement in Aviation)

YEARS OF *Experience* ARE NECESSARY

AT THE shops of Govro-Nelson a varied and proven experience in aviation engineering is combined with a specialized knowledge of aircraft engine requirements and production facilities that meet the highest standards of the industry for the precise machining of engine parts.

Aviation engine manufacturers who realize the vital necessity of correctness in design and accurate manufacture have come in increasing numbers to the shops of Govro-Nelson to incorporate the benefits of these unusual facilities into their engines.

You too can profit by this experience. Govro-Nelson engineers are always ready to consider your problems without obligation on your part.

THE GOVRO-NELSON COMPANY

1931 ANTOINETTE DETROIT

CRAFTSMEN TO THE AVIATION INDUSTRY

They make small landing fields larger

BENDIX

WHEELS AND BRAKES

Definite results of greater safety and vastly increased efficiency in ground maneuvers have established Bendix Wheels and Brakes as essential equipment for practical, profitable aircraft operation.

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Pitcairn Aircraft, Incorporated
Spartan Aircraft Corporation
Stearman Aircraft Corp.
Stinson Aircraft Corporation
Thomas-Morse Aircraft Corporation
Verville Aircraft Company
Chance Vought Corporation
U. S. Air Corps (for all ships)
U. S. Navy (Bureau of Aeronautics) etc.

BENDIX BRAKE COMPANY
SOUTH BEND, INDIANA
(Division of Bendix Aviation Corporation)

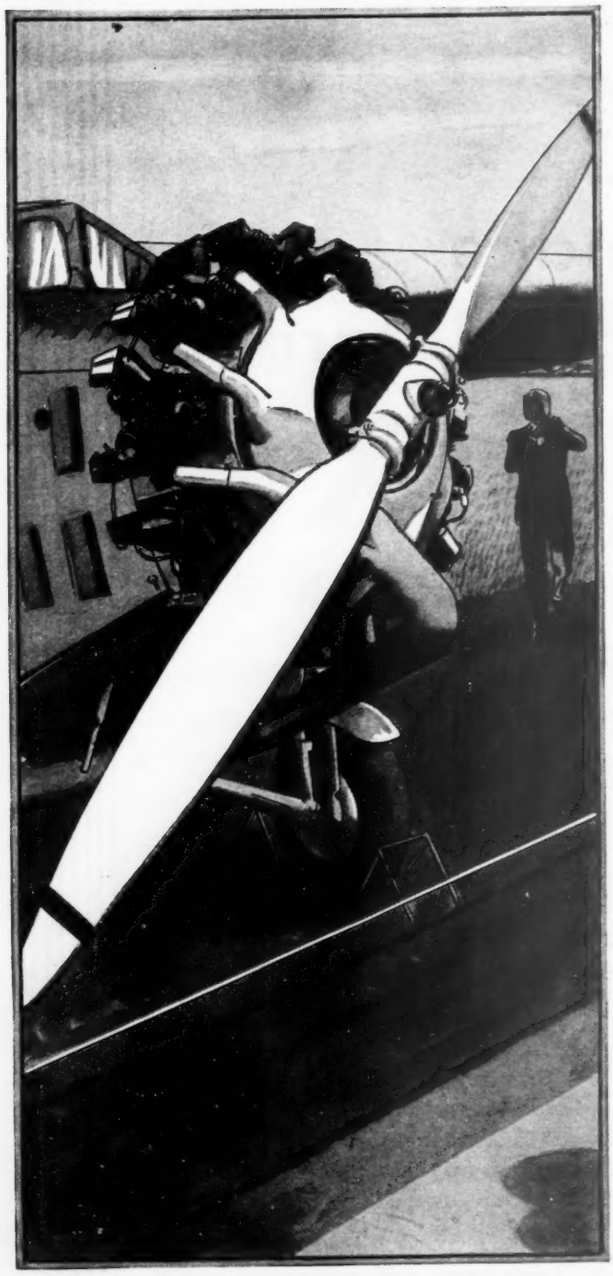
BENDIX 4 BRAKES

FOR SAFETY

FULLY PROTECTED BY PATENTS AND APPLICATIONS IN U. S. AND ABROAD

Air Mail Saves Time

3 MILES A MINUTE FOR MORE THAN THE GIRDLE OF THE GLOBE!



WHEN you hear that Frank Hawks streaked from Washington to Boston in 2 hours and 20 minutes, don't overlook the fact that a "Whirlwind" has driven his Travel Air some 26,000 miles—*averaging over 3 miles a minute!*

That's what you get in an engine by Wright . . . stamina that stands the gaff! Pilots know this by performance. Operators, by service checks. Passengers, by "on-schedule" travel.

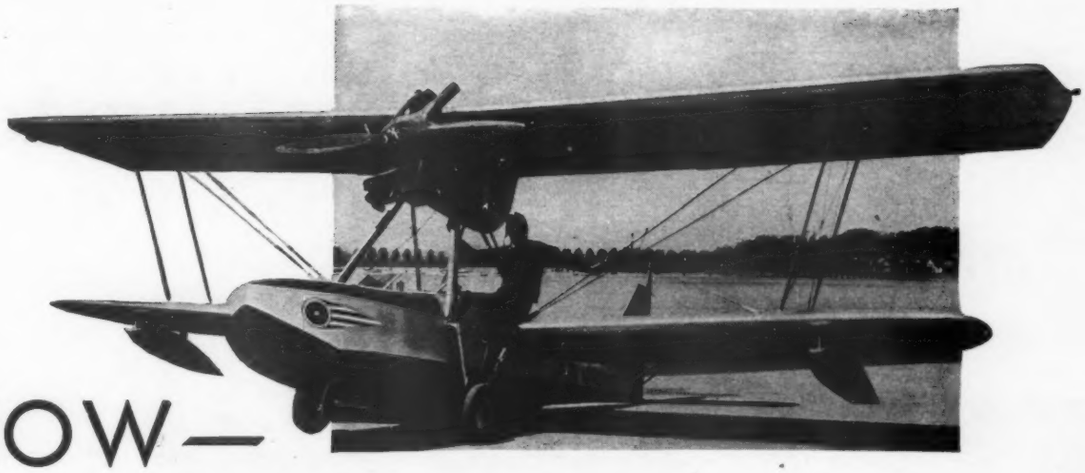
And just the other day, eight great Martin Patrol planes zoomed up from Cuba, soared toward Panama, *many miles away over water* and, with "Cyclone" engines, giants of Wright's famed tribe, completed one of the longest non-stop sea squadron flights yet made by the Navy!

Choice of the Army, the Navy, of Lindbergh, Byrd and Lieut. Al Williams, the "Cyclones" of 525 and 575 h.p. develop enough power *over and above their rated output* to fly the average-sized plane.

In 5, 7, and 9 cylinders, "Whirlwinds" of 165, 240, and 300 h.p. models power many types of planes. And, to round out the line, there is the Wright-Gipsy, American adaptation of the famous engine that continues to top all European records—including such long distance flights as Amy Johnson's to Australia.

To build one engine that leads one class is one thing. To build six engines that dominate is another thing. Yet that's what Wright has done for years, and will continue to do!

WRIGHT
AERONAUTICAL CORPORATION
PATERSON, NEW JERSEY
A DIVISION OF CURTISS-WRIGHT CORPORATION



NOW— AN AMPHIBION *That Really* PERFORMS

We've seen hard-boiled (and slightly skeptical) test pilots put the new Savoia S-31 through paces that no self-respecting little amphibion is supposed to attempt—spins, loops, rolls, inverted flight*—and come back with grins of satisfaction. For the S-31, powered with the 125 H.P. Kinner engine, sets entirely new standards for take-off, climb, and maneuverability. It really *performs*.

The possibilities of passenger-flying and student instruction from water have scarcely been touched. And the additional safety and pleasure of amphibion flying offers the quickest, surest approach to the prospective owner-pilot. Combining these advantages with the proven money-making qualities of the three-place open cockpit type, the new S-31 is in a class by itself.

Let us prove it to you at the Detroit Show. We want to tell you about our new dealer plan, which offers splendid territory and a real opportunity for profit. And we have a price announcement to make that you will find decidedly interesting. American Aeronautical Corporation, Port Washington, L. I.

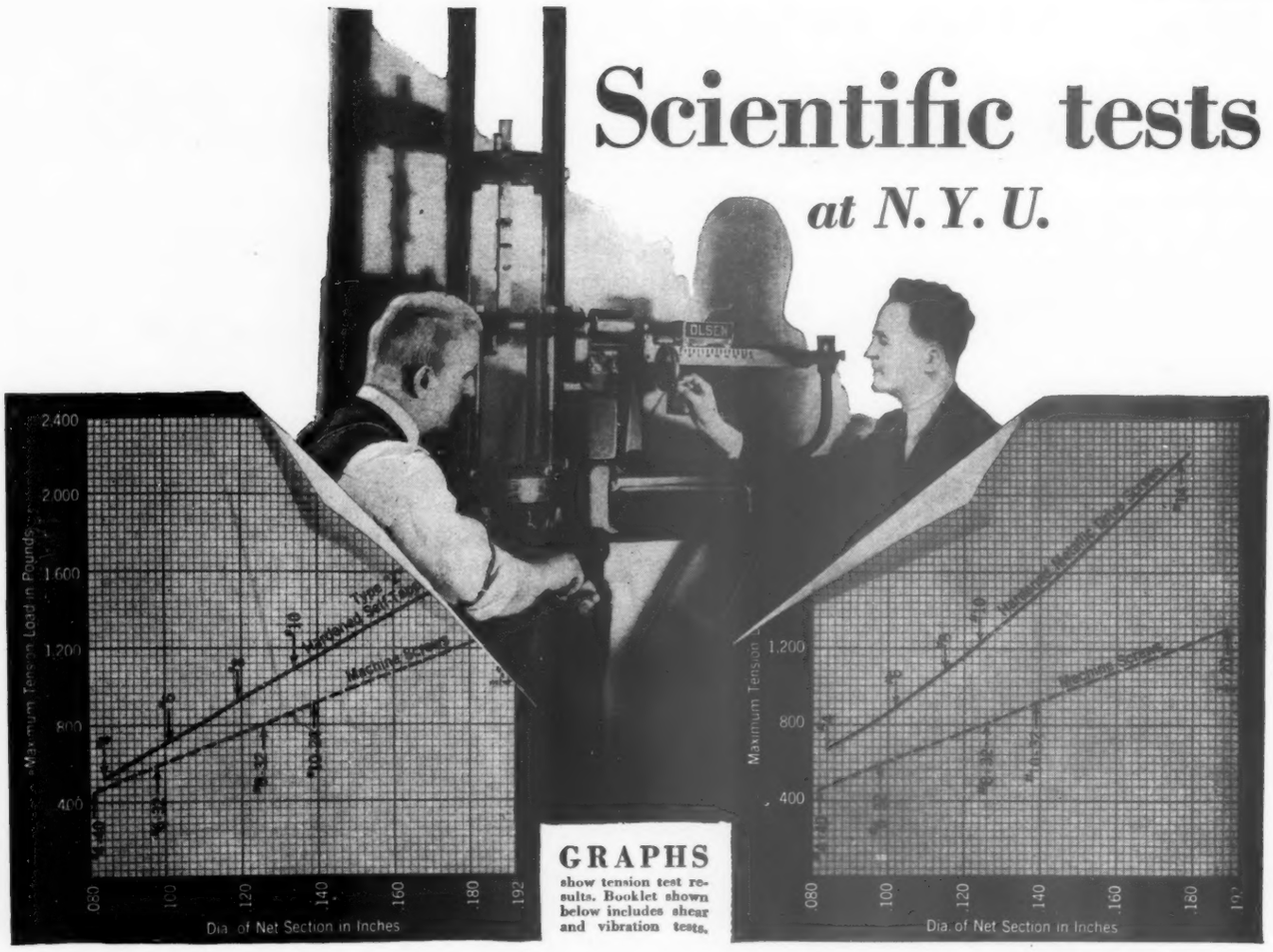
**In test flights only, of course. We do not encourage stunt flying.*

AMERICAN SAVOIA MARCHETTI

Write for information about flying boat and amphibion instruction

Scientific tests

at N. Y. U.



GRAPHS show tension test results. Booklet shown below includes shear and vibration tests.

prove that fastenings made with Self-tapping Screws have GREATER TENSION and SHEAR STRENGTH than fastenings made with machine screws

THE question, "Do Self-tapping Screws, noted for economy in assembly work, have greater or less holding power than the fastening devices they usually replace?" has been answered by scientific tests conducted by the College of Engineering, New York University.

In an Olsen testing machine, tension and shear loads were applied to a number of metal assemblies made with the two types of Self-tapping Screws—Hardened Metallic Drive Screws and Hardened Self-tapping Sheet Metal Screws. Under identical conditions—machine screws—the most common alternative means of fastening, were also tested. These tests proved that fastenings made with Self-tapping Screws have invariably higher tension and shear strength. Other tests demonstrated their superior holding qualities under vibration.

The booklet offered below completely describes and illustrates all of the tests—tension, shear and vibration—conducted at the College of Engineering, N.Y.U. It will be sent to you free—just mail the coupon. With it you get another interesting booklet, showing the large savings gained on the metal assemblies of many well-known products through the use of these unique Screws that eliminate tapping, fumbling with bolts and nuts, and other fastening difficulties.

PARKER-KALON *Hardened* Self-tapping Screws

PAT. IN U. S. AND FOREIGN COUNTRIES

PARKER-KALON CORPORATION, DEPT. M., 192-200 VARICK ST., NEW YORK, N. Y.

Send me free booklets on the Security and Economy of assemblies made with Self-tapping Screws.

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Address _____

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ELGIN NAT'L WATCH CO
U. S. A.
AVIGO
COMPASS CORRECTION
COMPASS NO. _____ SHIP NO. _____
N E S W N
FOR 0 30 60 90 120 150 160 210 240 270 300 330 360
STEER
COR

Illustrated here, actual size, is the NEW Elgin Compass — similar in appearance to previous Elgin models, but entirely new in performance.

ELGIN

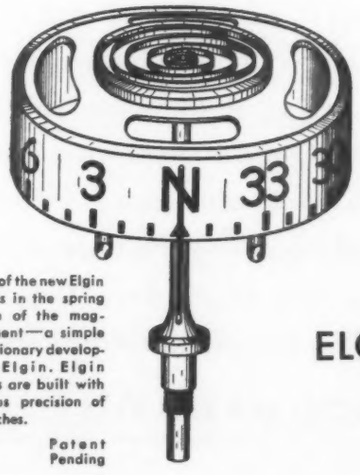
announces a new stabilized compass...

QUICKLY — steadily — surely — this new Elgin Compass indicates the true course *without undue oscillation.*

The stabilization of the new Elgin Compass is accomplished by means of a new type of spring suspension of the magnetic element . . in a special damping liquid.

There is no side-swing to keep you guessing — no uncertainty about the exact reading. Elgin gives you perfect accuracy under all conditions.

Pilots, Manufacturers and Transport Operators will want full information about this remarkable new development. Details will be sent on request.



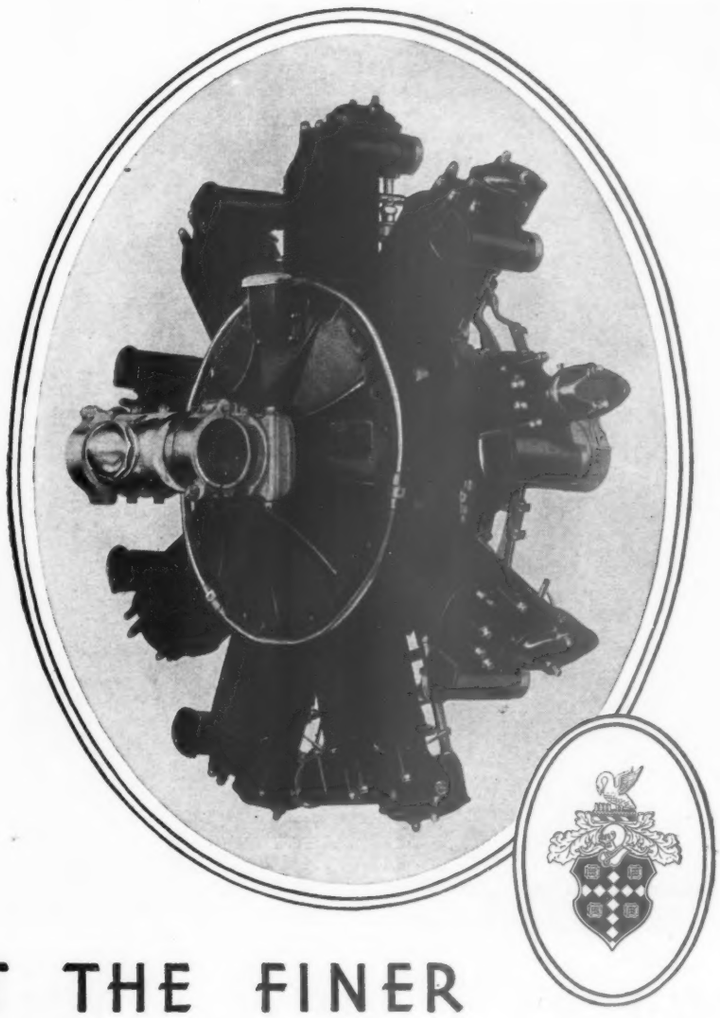
The secret of the new Elgin Compass is in the spring suspension of the magnetic element — a simple yet revolutionary development by Elgin. Elgin Compasses are built with the famous precision of Elgin Watches.

Patent Pending

ELGIN NATIONAL WATCH COMPANY

AIRCRAFT INSTRUMENT DIVISION

Elgin, Illinois



INSPECT THE FINER
PACKARD-DIESEL
AT THE NATIONAL AIRCRAFT SHOW

Again this year the Packard-Diesel display will attract thousands of interested spectators at the National Aircraft Show. For Packard will have on exhibition the finer Packard-Diesel—refined in detail, improved in performance. Also on display will be a special cut-away engine—electrically driven—showing just how the Packard-Diesel operates. » » » Visit the Packard booth—spaces 97 to 105 Herbert Hoover Airway—and inspect the engine which during the past year has set new standards of aircraft performance. See also the Packard-Diesel equipped ships which will be exhibited by various leading aircraft manufacturers.

PACKARD MOTOR CAR COMPANY
DETROIT, MICHIGAN

Western Canada Airways Now Flies LAIRDS

WESTERN CANADA AIRWAYS operations connect the widely-separated settlements of half a continent. Their mail and passenger service cuts weeks into days, and days into hours.

Quite naturally, flight over long distances —often over difficult terrain—leads them to seek the utmost in dependability. Hence, their contract for a fleet of Laird Standard Wings pays tribute to Laird's reputation for unfailing dependability and high efficiency.

Above is pictured the first of the Western Canada Airways fleet. It is powered with the Wright J-5 200 H. P. engine, and is equipped with retractable landing lights and complete night flying equipment. A spacious mail compartment and commodious 2-passenger cockpit forward of the pilot's seat adapt these ships to every type of transport service. Three of these ships are now in their service.

Laird airplanes are built for the sportsman-pilot and the commercial buyer whose chief interest is high efficiency and dependability rather than price. We invite such buyers to write for our free booklet and the name of the nearest distributor who will arrange a demonstration.

DISTRIBUTORS

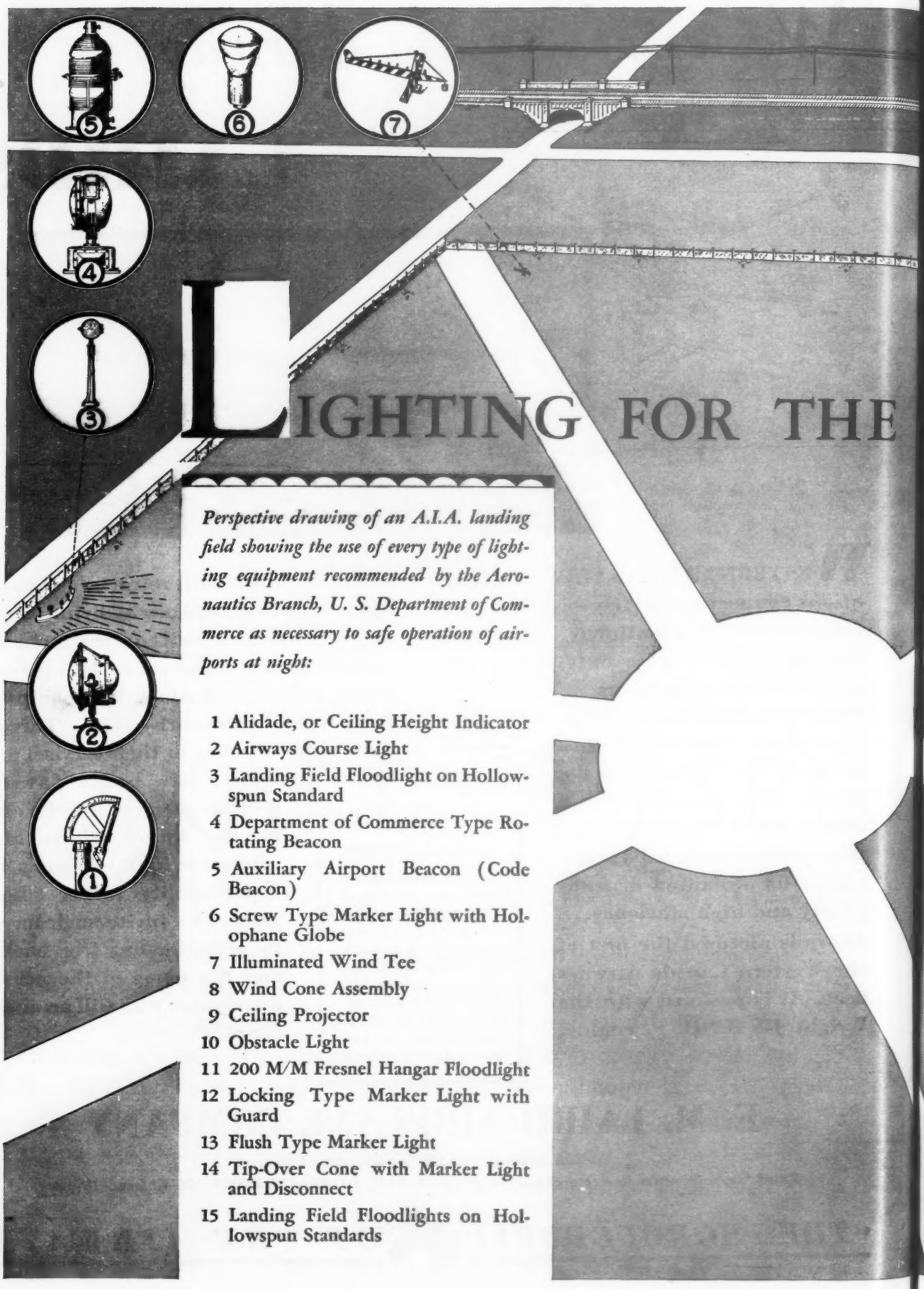
Exclusive territories available for established firms with funds and suitable demonstration facilities to handle LAIRD sales. Enlarged factory space and increased production facilities insure prompt delivery.

E. M. LAIRD AIRPLANE COMPANY

Ashburn Field -- 4500 W. 83rd St., Chicago

Laird Airplanes are manufactured only by the E. M. LAIRD AIRPLANE COMPANY, Chicago, Illinois

"THE THOROUGHBRED OF THE AIRWAYS"



LIGHTING FOR THE H

Perspective drawing of an A.I.A. landing field showing the use of every type of lighting equipment recommended by the Aeronautics Branch, U. S. Department of Commerce as necessary to safe operation of airports at night:

1 Alidade, or Ceiling Height Indicator
2 Airways Course Light
3 Landing Field Floodlight on Hollowspun Standard
4 Department of Commerce Type Rotating Beacon
5 Auxiliary Airport Beacon (Code Beacon)
6 Screw Type Marker Light with Holophane Globe
7 Illuminated Wind Tee
8 Wind Cone Assembly
9 Ceiling Projector
10 Obstacle Light
11 200 M/M Fresnel Hangar Floodlight
12 Locking Type Marker Light with Guard
13 Flush Type Marker Light
14 Tip-Over Cone with Marker Light and Disconnect
15 Landing Field Floodlights on Hollowspun Standards

HIGHEST GOVERNMENTAL RATING—

HERE is the complete line of Westinghouse airport lighting equipment, which meets every requirement of the Department of Commerce to give your airport the highest government rating.

This equipment is backed by years of experience in all classes of illumination.

Call in an airport lighting specialist from our district office near you. He can plan a flexible system of lighting for you—a system you can progressively expand in the future.

The Highways of the air meet at well-lighted ports

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TUNE IN THE WESTINGHOUSE PROGRAM OVER KDKA, KYW, WBZ AND ASSOCIATED N. B. C. STATIONS SUNDAY EVENINGS.

MAKE EVERY PLANE
A POSTAL TELEGRAPH OFFICE

Extra service to passengers
...NO COST TO YOU

First of all, consider this important fact. Why shouldn't the passenger who travels the skyways have the same communication facilities that are accorded the traveler of the highways...the rails...and the ocean lanes? No reason at all...particularly not when the air transport company can provide such facilities at absolutely no cost.

The answer is to make every plane a Postal Telegraph station by the simple expedient of supplying Postal Telegraph blanks and instructing the plane crew how to file passengers' messages at terminal points en route.

No fuss...no bother...no delay. The passenger simply writes the message...some member of the plane crew files it as a matter of courtesy and service. Passengers like it. It builds good will. It represents an *extra* service.

So do this today. Wire Postal Telegraph headquarters collect. A Postal Telegraph Representative will call and tell you more about it.

Postal Telegraph is the only American telegraph company that offers a world-wide service of coordinated record communications. Through the great International System of which Postal Telegraph is a part, it reaches Europe, Asia, The Orient over Commercial Cables, Central America, South America and the West Indies over All America Cables, and ships at sea via Mackay Radio.

THE INTERNATIONAL SYSTEM

Postal Telegraph

Commercial Cables — *All America Cables*

Mackay Radio

Engine Speeds brought to your instrument panel . . .

Model 44 GENERATOR—*Small and compact; weighs only 1 pound, 5 ounces. Mounts directly on SAE Tachometer outlet on engine. Generates a voltage proportional to its driven speed, which is carried by wires to indicator.*

TROUBLE free, dependable indicators, denoting R.P.M. of engine are as essential on aircraft instrument panels as altimeters, banking indicators, fuel and oil gauges, and other instruments necessary to safe and intelligent flying.

The Weston Tachometer (Electric), which has enjoyed many years of excellent reputation for dependable performance in general industrial applications, on the leading railroads, in the marine and aviation fields, has many outstanding advantages that command the attention of aeronautical engineers, pilots, and maintenance men. These are—

(a) Accurate, steady, dependable indications.

(b) Light weight.

(c) Simplicity and ease of installation.

(d) Practical freedom from all maintenance.

(e) Complete elimination of troublesome flexible drive shafts.

(f) Unaffected by temperature changes.

(g) Indicators give 270° deflection over 5½-in. scale.

(h) Indications unaffected by banking, etc.

(i) Fully shielded to prevent interference with magnetic compass or radio.

Model 545 INDICATOR—*Mounted in a standard aircraft case used with instruments of the 3-in. group. Furnished with black dial with luminous markings and pointer.*

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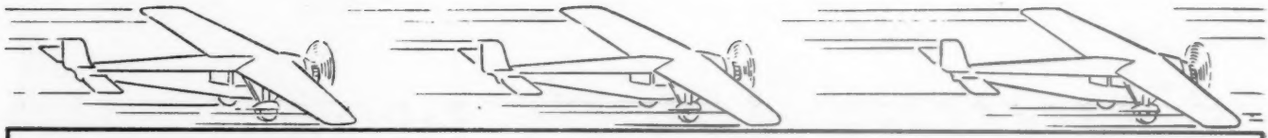

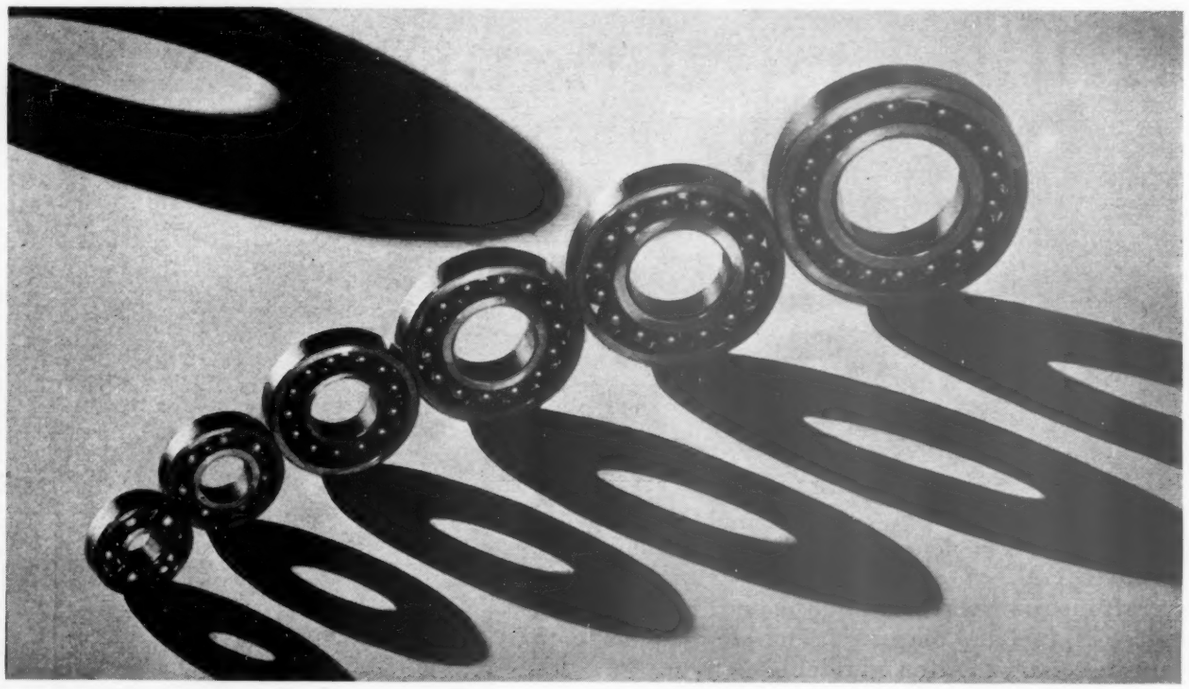

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Fafnir Single Row Ball Bearings made to inch dimensions are illustrated above. Lighter weight and smaller sections make this series more adaptable to airplane controls than the metric dimension bearings. Moreover, most designers prefer to work with the inch rather than with metric standards.

This is but one of the designs which Fafnir engineers have developed in conjunction with aircraft engineers and designers. Cartridge types, integral double bearings and other special types are described in the Fafnir Aircraft Data Sheets. Write for copies.

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THE RUGGED DEPENDABILITY of this world famous engine makes possible two more records in which engine performance is of paramount importance.

Another endorsement of the sound construction which was so well demonstrated in the 1930 All America Flying Derby.

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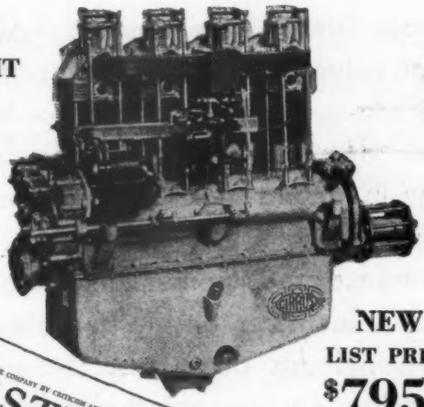

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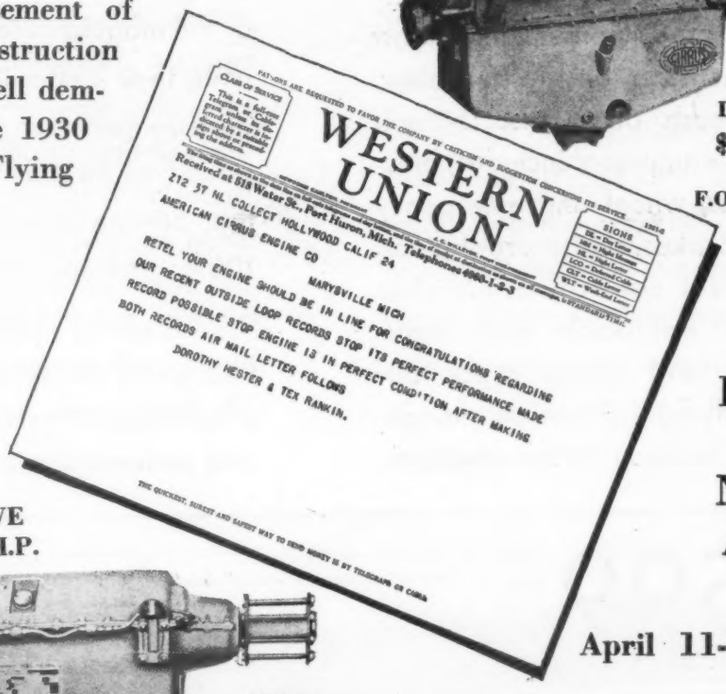

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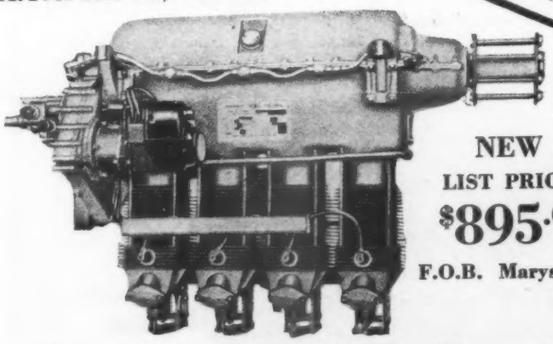
April 11-19, 1931

CIRRUS HI-DRIVE A.T.C. No. 60, 95 H.P.



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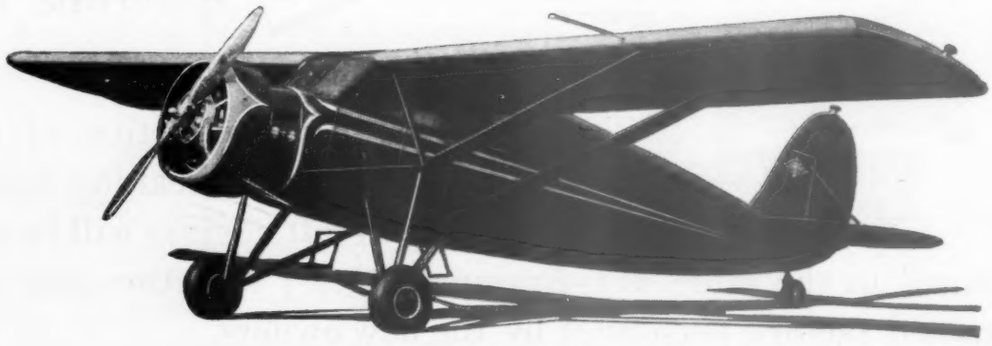
Leads In Value

Today Stinson is the standard of Aircraft value. Even competitors use the Stinson as a basis of comparison for their own planes. In scientific design, in rugged construction, in easy maneuverability, in efficient performance, in equipment, in comfort and refinements, and in durability, Stinson leads all others. Stinson standard equipment includes; electric starter, wheel and emergency parking brakes, shatterproof glass, dual wheel control, adjustable stabilizer, adjustable pilot seats, hydraulic and spring shock absorbers, flying instruments, navigation lights, balloon tire tail wheel, etc.

Leads In Sales

Of Cabin Planes. According to Cram's Aeronautical Report on airplane sales, in 1930 Stinson sold more planes than all other cabin manufacturers combined. While one of the manufacturers sold 37 more units, their best-selling plane was a 3-passenger open type of 100 H. P., priced at $4250. Compared with this, Stinson offers a plane that is 100% enclosed; 115% more H. P.; 33⅓% more passenger space; electric self-starter; adjustable metal propeller; and every possible luxury and convenience at little more cost.

$5995



215 H. P. 4-Passenger Cabin Plane

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LEADS

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With 16 years' experience. Stinson changed airplane design in 1925 by building the first plane which combined closed cabin comfort, inherent stability, such that the machine would fly itself in the air; electric starter, brakes and cabin heaters. All modern cabin airplanes now follow this design. In 1930 Stinson made available for the first time, at the radically low price of $5995, an even better 4-passenger cabin plane than was formerly obtainable in the $11,000 class. Today the Stinson plane definitely and exclusively establishes a totally new standard of value.

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Stinson makes available for the first time in the history of aviation the benefits that are possible only when vast production resources, financial strength, experienced management and great buying power are concentrated on the building and marketing of better planes at new, radically low prices. Everyone profits from this program. The world applauds Stinson's success in making air transportation practical and safe and placing it within the reach of the thousands who have been waiting for it.

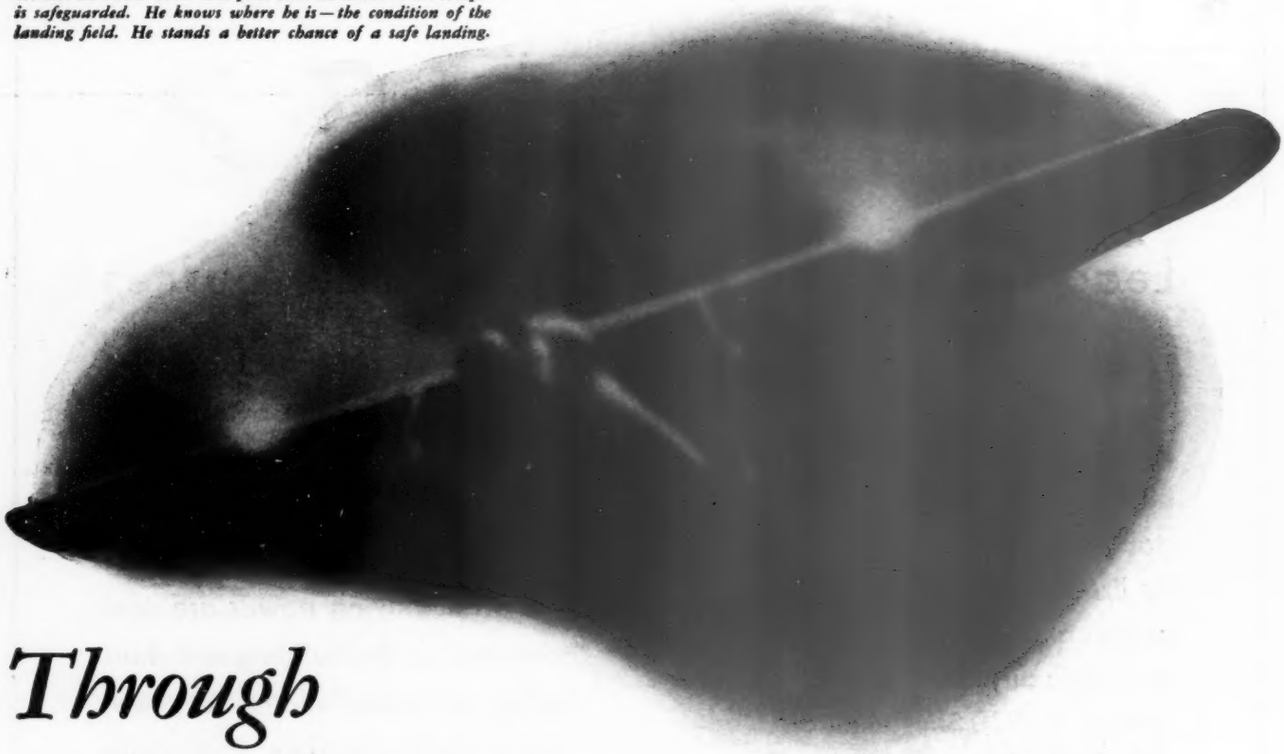
Used by Century Air Lines, *Inc.*, and New York-Philadelphia-Washington Air Way Corporation and Thompson Aeronautical Corporation and Western Air Services, *Inc.*

11-Passenger Tri-Motored
Stinson Airliner, $25,900

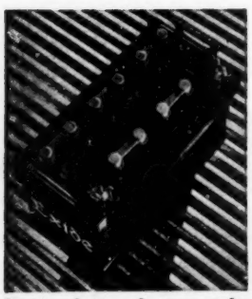
A Transport powered by 3-215 H. P. Lycoming Engines. Electric starter on each motor, standard equipment. High speed, 140 M. P. H. Cruising speed, 1750 R. P. M., 115 M. P. H. Pay load 2,100 lbs.

Motored Executives Model, price upon request. · All prices F. O. F. Wayne, Mich. · Equipment other than standard, extra. Prices subject to change without notice · Stinson Aircraft Corporation, Wayne, Mich. · Division Cord Corporation.

Low ceiling, ground blotted out below. Radio communication becomes most vital then. The pilot with an Exide in his cockpit is safeguarded. He knows where he is—the condition of the landing field. He stands a better chance of a safe landing.



Through "SOUP" a Mile Thick . . . to a Safe Landing



Here's a battery that was made to fly. This Exide Aircraft Battery is light-weight—compact—safe.

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AIRCRAFT
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Pilots fly with confidence as dependable Exides keep radio communications alive

"HEAVY FOG" . . . "ceiling 400 feet"..."You're directly overhead," come the messages to the pilot winging above the fog bank. A few minutes later he's made a safe landing.

Exide Aircraft Batteries help make radio communication certain—and do other jobs just as dependably. They furnish current for landing, navigation and instrument lights—starting and ignition. Exides have proved their worth over thousands of miles of sky lanes. They are so designed that the electrolyte will not spill—even in the hardest kind of flying service. Their construction is compact and light-weight. Three very desirable flying features. But just a few of the reasons why they are preferred.

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Since its adoption by the Government during the World War, HASKELITE has been recognized as the standard of quality for aircraft plywood. Justly so, because it is the only plywood which has consistently met Army and Navy specifications for fourteen years.

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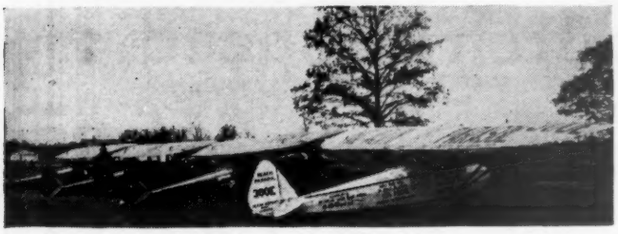

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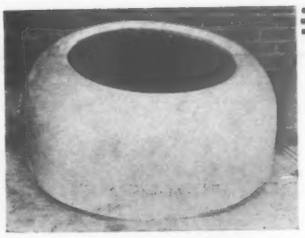

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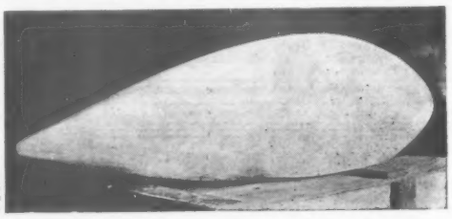
Write for further details on any metal parts for an aeroplane that requires spinning or power hammering.



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can invariably be filled by a friend.

The Searchlight Section

of this issue covers the current business wants of the industries in which this paper is read.

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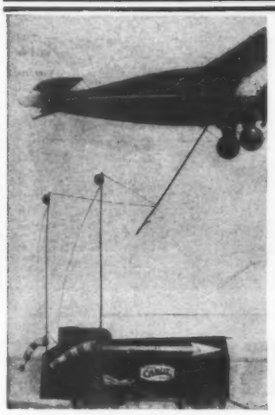

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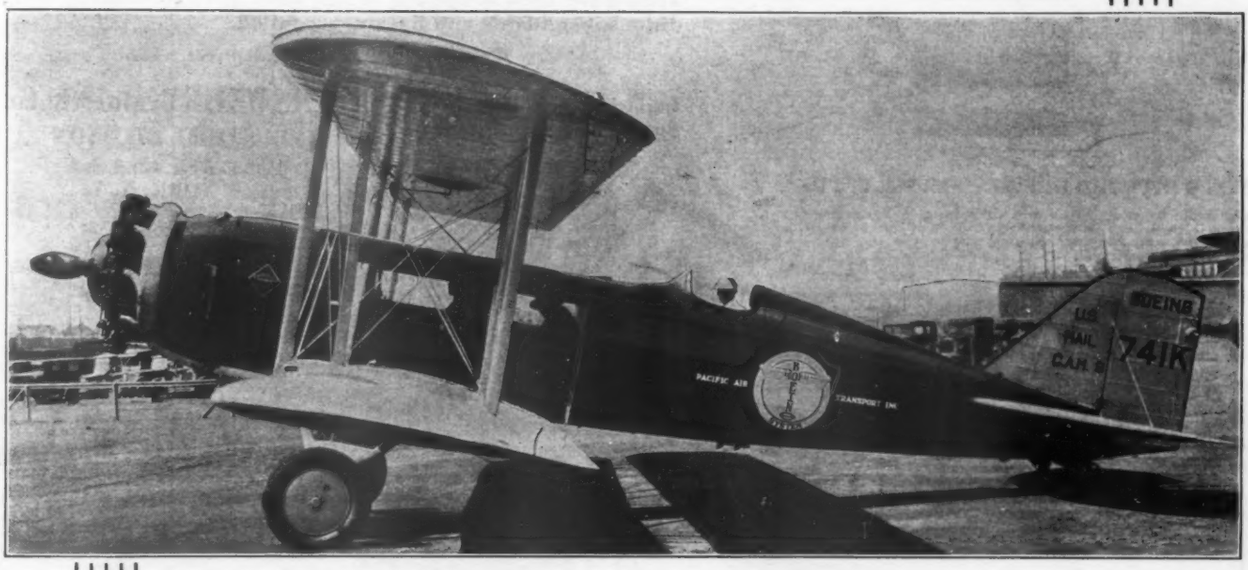

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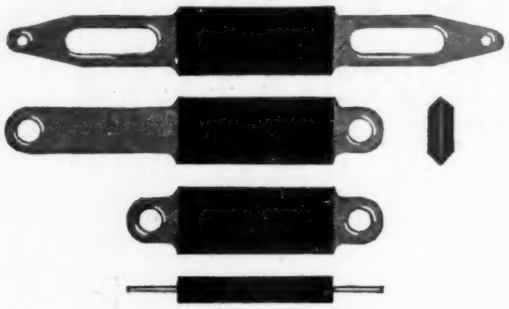

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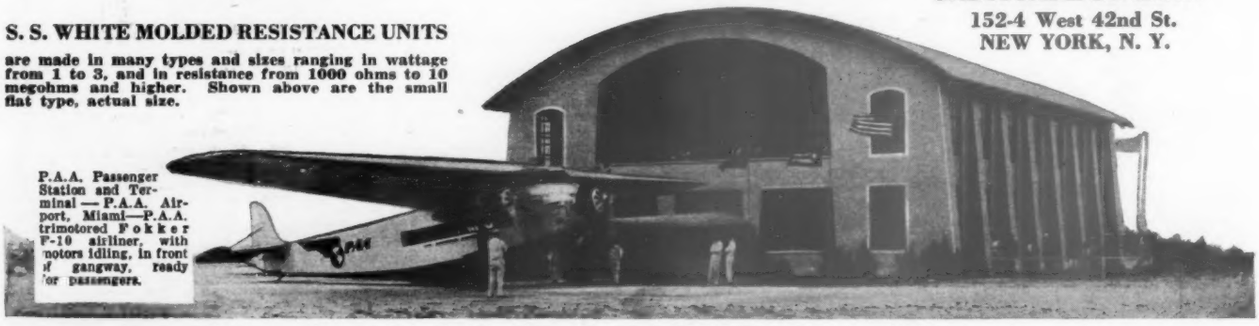

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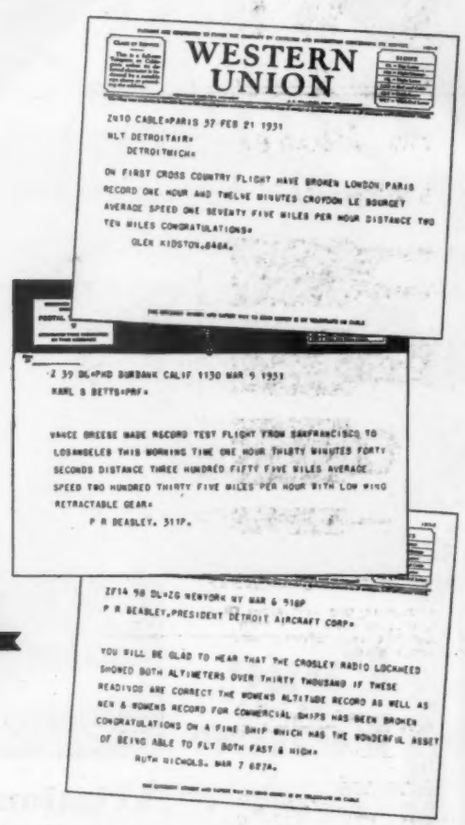
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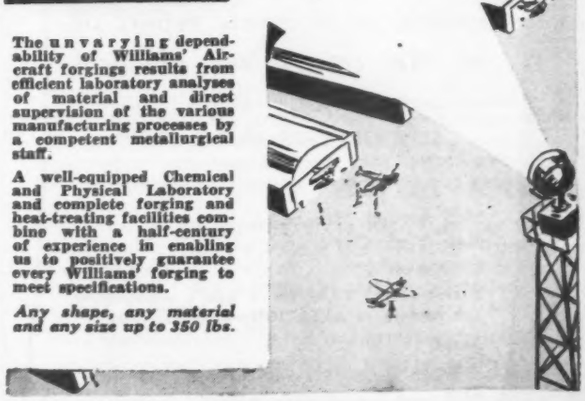

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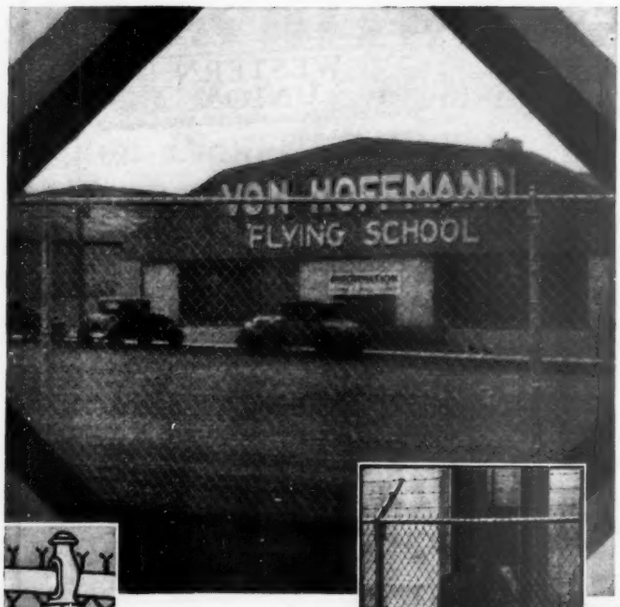

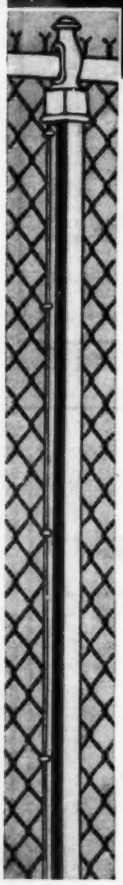

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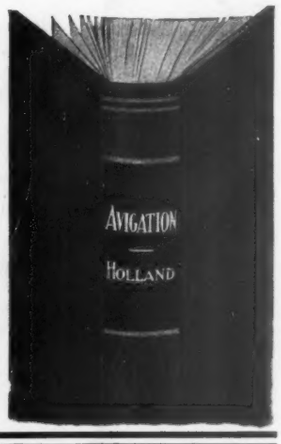

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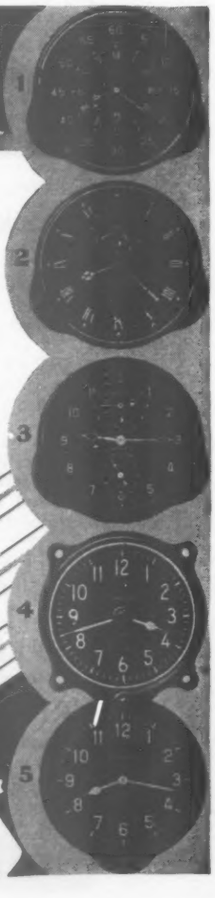

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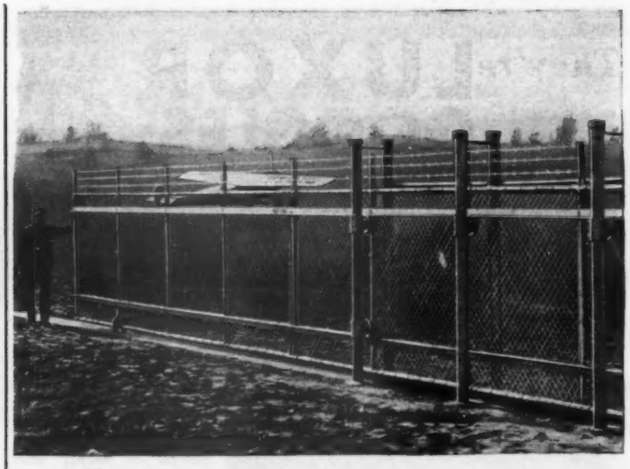

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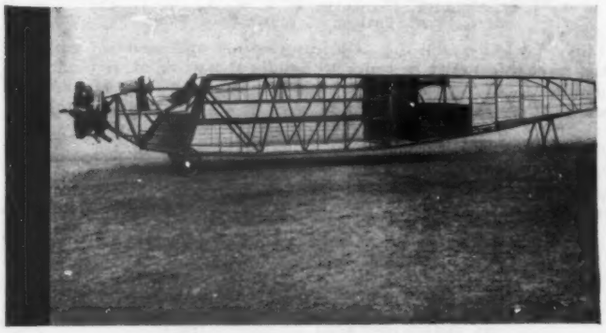

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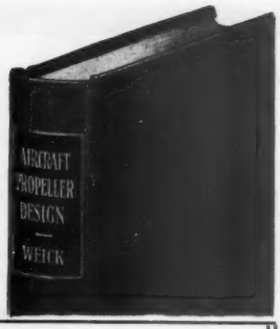

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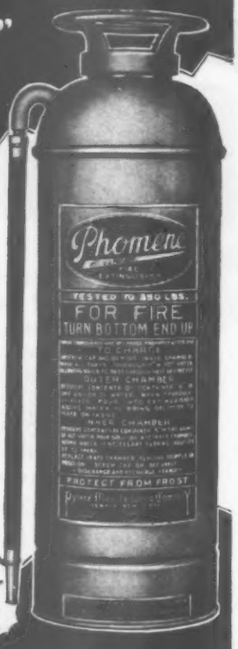

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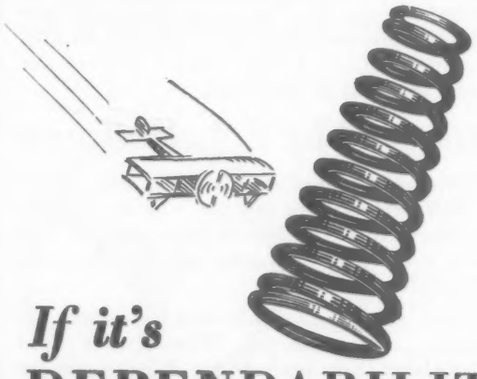

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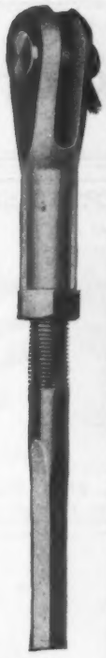

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powered with Wright J-6, 165 hp. Three months since new, has 30 hrs. time, by owner for pleasure. Equipped with Bendix brakes, Standard Steel propeller, Triplex glass, and other features. Priced $2,875. Immediate for cash sale.

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landing lights, flares, J-5 motor, 255 hours—no more! Full set new Pioneer instruments in front cockpit, including compass. Rear cockpit standard mail dash board. Motor overhauled including rings, re-facing and re-seating valve seats, new B-G Plugs and complete new wire harness and terminals. Prop refinished at factory. Ship resurfaced and waxed and new bearings in wheels. Always kept in hangar, never abused and never cracked. **Price $4,500.** If not prepared to pay that do not answer.

American Cirrus Upright Motor For Sale

35 hours, DePalma super charger with Hamilton standard steel prop and two spare blades never used, $400 worth of spare parts, including two extra cylinder heads, 1 new barrel, complete wire harness, set of valves. These parts never used. Many minor parts not mentioned. Complete **$750.**

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Used Wasp, Hornet and Wasp Junior Engines

completely overhauled at factory, at substantial price reductions.

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United Airports of Connecticut, Inc.
Hartford, Conn.

Special Reduced Price Sale

To New York and Pennsylvania Buyers.

New Eaglerock Airplanes

Priced flyaway Colorado with motors as follows: OX—$1675, OXX—$1725, Hisso A—$1775, Hisso E—$1850, Kinner K5—$2150, Wright J5—$2975, Wright J65—$3125, also several demonstrators flyaway Buffalo under $1000.

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Anzani 120 H.P. Motor, Cessna conversion, complete with Paragon Prop. Oil Cooler, Scintilla Mags, and High Pressure Oiling System. About 100 hrs. time. For quick sale, $250.00 cash.

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The Best Buys in the United States. Two J-4 Whirlwind Wacos, new last Spring, and one J-5 Whirlwind Waco. All with Steel Propellers and Haywood Air Starters; One OX5 Waco 90 also Two OX5 Travel-Airs. These ships were recently licensed and are priced to sell quick. Terms to responsible buyers.

Write or Wire

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6-place Monoplane Model 6000. Wright J-6, 300-hp. Motor. Completely equipped with Haywood Starter, Lavatory Room, Landing Lights, Flares, etc. Only 200 hours, in perfect condition. Cost $14,200; priced for quick sale, $8,000.

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32 hours air time. $175 cash.

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NEW OX5'S $178.50

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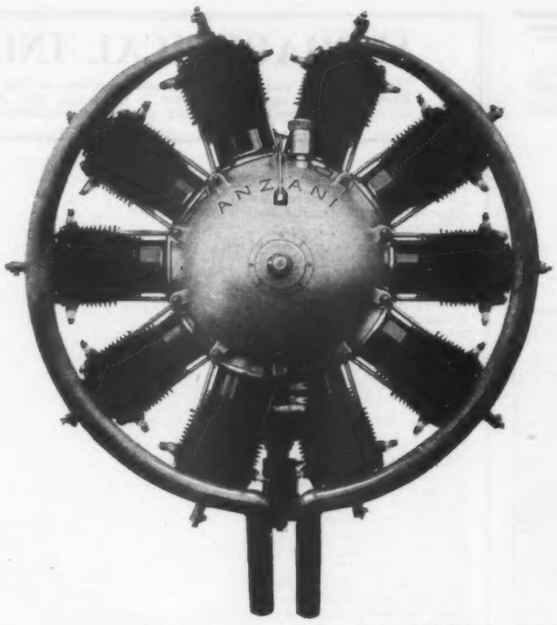

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10 cylinders, radial air cooled. Bore 4⅛ x 4.73 in.
Rating 120 hp. at 1,550 r.p.m. Weight dry complete 345 lbs.
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Aluminum alloy pistons with full floating pins and aluminum retainer plugs.
Mechanically operated intake valves.
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Gear pressure and scavenging oil pumps.
Babbitt connecting rod bearings.
Mounting ring 19 in. in diameter.
These Engines are new, unused and ready to run complete with all necessary equipment, ring exhaust manifold, propeller hub, etc. Only a few available properly boxed f.o.b. Providence, R. I.
Each engine fully guaranteed by us.

$400.00

Special Hamilton Standard 8 ft. 4 in. propeller for these motors, new, **$225.**

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We have facilities for mounting 120 hp. Anzani Engine in your ship, and will furnish and install a new motor, new metal propeller, new mount, cowl in motor, and furnish all ready to fly for $850. (You to deliver ship or fuselage to Providence, R. I.) All prices subject to immediate acceptance.

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All ships carry Dept. of Commerce licenses. Prices, cash, flyaway Des Moines.

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Parts for 201 American Eagle

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OX5 without spinner	40
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All other types propeller 50% discount

These prices for March only

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for
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by using
"Capitol" Standardized Conversion Parts
Prices that will surprise you

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WITH WRIGHT J-6 WHIRLWIND MOTOR

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Complete Engine Overhaul made after 427 hours.
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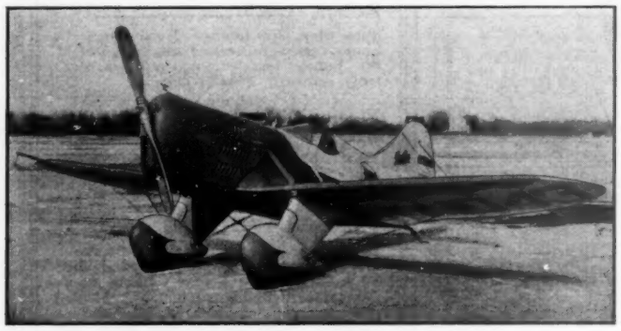

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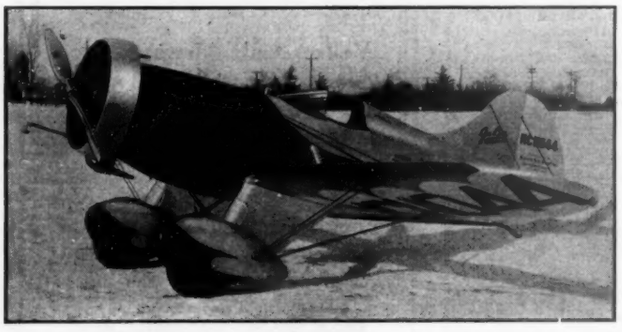

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ALPHABETICAL INDEX

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Aviation* assumes no responsibility for errors or omissions.

Name	Page
Aero Pickup Service Corp.	105
Aeronautical Chamber of Commerce	23
Albertson & Co., Inc.	45
Aluminum Co. of America	24
American Aeronautical Corp.	87
American Cirrus Engines, Inc.	97
American Gas Accumulator Co.	47
American Propeller Co.	57
American Sheet & Tin Plate Co.	77
American Telephone & Telegraph Co.	69
Amphibions, Inc.	62
Anchor Post Fence Co.	75
Austin Company, The	12
Autogiro Company of America	8-9
B. G. Corp., The	52-53
Barbour-Stockwell Co.	105
Barnes Co., Wallace	116
Barnes, Gibson & Raymond, Inc.	109
Bellanca Aircraft Corp.	38
Bendix Aviation Corp.	11
Bendix Brake Co.	85
Bendix-Stromberg Carburetor Co.	81
Bird Aircraft Corp.	26-27
Black & Decker Mfg. Co.	73
Boeing Airplane Co.	107
Boeing School of Aeronautics	106
Chamberlin, Clarence D.	110
Champion Spark Plug Co.	65
Chase & Co., L. C.	82
Continental Aircraft Engine Co.	28
Curtiss-Wright Airplane Co.	First Cover, 15, 16, 17, 18
Cyclone Fence Co.	113
Detroit Aircraft Corp.	109
Eclipse Aviation Corp.	Second Cover
Edo Aircraft Corp.	22
Electric Storage Battery Co.	100
Elgin National Watch Co.	89
Fafnir Bearing Co.	96
Firchild Aerial Camera Corp.	5
Fleet Aircraft, Inc.	10
Fleischmann Transportation Co.	105
Fokker Aircraft Corp. of America	80
Frisbie Aircraft Products	112
General Electric Co.	74
Gibson Co., The Wm. D.	114
Gilbert & Barker Mfg. Co.	51
Gilmore Oil Co.	54
Goodyear Tire & Rubber Co.	55
Govro-Nelson Co.	84
Granville Bros. Aircraft, Inc.	124
Great Lakes Aircraft Corp.	66
Gulf Refining Co.	43
Hamilton Standard Propeller Corp.	64
Hartshorn Co., Stewart	117
Haskelite Mfg. Corp.	102
Heath Aircraft Corp.	104
Hill Aircraft Streamliners Co.	104
Hurley-Townsend Corp.	33
International Nickel Co., Inc.	60
International System Postal Telegraph	94
Irving Air Chute Co., Inc.	2
Jacobs Aircraft Engine Co.	Inserts 29-30-31-32
Jaeger Watch Co.	112
Kansas City Chamber of Commerce	83
Kester Solder Co.	113
Kidde & Co., Walter	63
Laird Airplane Co.	91
Leece-Neville Co.	48
Liberty Aircraft Sales & Mfg. Co.	101
Lobdell Emery Co.	114
Los Angeles Chamber of Commerce	4
Martin Co., The Glenn L.	Third Cover
Martin Motors Co., Glenn L.	Inserts 49-50
McGraw-Hill Book Co.	112, 116
Menasco Motors, Inc.	114
Metallurgical Laboratories, Inc.	7
Meyrowitz, Inc., E. B.	114
Mono Airfact Corp.	Inserts 82A-82B

National Aircraft Engineers 106
National Aircraft Show 117
Norma-Hoffmann Bearings Corp. 39
Northrop Aircraft Corp. 20-21

Ohio Seamless Tube Co. 115

Packard Motor Car Co. 90
Page Fence Association 110
Parker-Kalon Corp. 88
Parks Air College 79
Pennzoil Company 103
Perry-Austen Mfg. Co. 111
Philadelphia Business Progress Association 59
Pioneer Instrument Co. 19
Pratt & Whitney Aircraft Co. ..... Fourth Cover
Pyrene Mfg. Co. 116

Quaker State Oil Refining Co. 56

Raymond Mfg. Co. 111
Richfield Oil Co. 78
Roebling's Sons Co., Joseph A. 71

Scintilla Magneto Corp. 125
Searchlight 118, 119, 120, 121, 122, 123
Service Steel Co. 126
Sioux Aircraft Corp. 42
S.K.F. Industries, Inc. 35
Sky Specialties Corp. 76
Sperry Gyroscope Co., Inc. 46
Stanavo Specification Board 36, 37
Standard Oil Co. of N. Y. 67
Standard Steel & Bearings, Inc. 61
Stearman Aircraft Co. 58
Stinson Aircraft Corp. 98, 99
Stromberg-Carlson Tel. Mfg. Co. 41
Summerill Tubing Co. 6
Switlik Parachute & Equipment Co. 68
Szekely Aircraft & Engine Co. 40

Thompson Products, Inc. 44
Texas Co., The 14
Timken Roller Bearing Co., The 13
Titanine, Inc. 104
Triangle Parachute Co. 115

Vought Corp., Chance 70

Waco Aircraft Co. 25
Warner Aircraft Corp. 72
Western Electric Co. 34
Westinghouse Elec. & Mfg. Co. 92-93
Weston Electrical Instrument Co. 95
White Dental Mfg. Co., S. S. The 108
Williams Co., J. H. 109
Wright Aeronautical Corp. 86
Wyman-Gordon Co. 3

Zapon Co., The 111

SEARCHLIGHT

Classified Advertising

POSITIONS VACANT 120
POSITIONS WANTED 120
MISCELLANEOUS 120
BUSINESS OPPORTUNITIES 120
TRADE 120
USED AND SURPLUS EQUIPMENT 120-123
WANTED TO PURCHASE 120

AIRCRAFT SERVICE DIRECTORY

Air Transport Equip. Co., Inc. 118
Boston Auto Gage Co. 118
Bowers Mfg. Co. 118
Posey & Co., J. V. G. 118
State Mfg. & Eng. Co. 118
Stewart Technical Trade School 118
Sweebrock Aviation Co. 118

PROFESSIONAL SERVICES

Lancaster, Allwine & Rommel 118
National Aircraft Engineers, Inc. 118
Polachek, Z. H. 118
Roberts (M. E.) E. W. 118

WHERE TO FLY

Page 119

SCINTILLA

AIRCRAFT MAGNETOS

THIS company expects that the use of Scintilla Aircraft Magnetos will always be in direct ratio to the service its product gives the great industry of aviation.

Effort is concentrated on building a unit that will perform faithfully and well; with full knowledge that aviation engineers recognize good performance when they see it.

SCINTILLA MAGNETO CO., INC.
SIDNEY, NEW YORK

Contractors to the U. S. Army and Navy
(Division of Bendix Aviation Corporation)

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ACCESSIBILITY

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THERE are a lot of good reasons why the list of prominent airplane manufacturers who use "Service" Seamless Steel Aircraft Tubing has increased steadily year after year. One of the most important, is the fact that the strength of "Service" Tubing is *always* uniform and the high standard of "Service" Quality is consistent with every order. "Service" Seamless Steel Aircraft Tubing, in your airplanes, will deliver the maximum in structural safety. All aircraft grades are available for instant delivery at four central warehouses. *Write your nearest branch for monthly stock reports.*

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BUFFALO	CINCINNATI	DETROIT	LOS ANGELES

Supplement to AVIATION, April, 1931.

A PLATFORM FOR AMERICAN BUSINESS

A Statement of Underlying Principles with some Practical Suggestions to Guide in Planning Future Progress

PRESENTED BY McGRAW-HILL PUBLISHING COMPANY, INC.

THE BUSINESS DEPRESSION of 1930 was no mere passing episode. The appalling loss and suffering entailed have struck home the more forcibly because they followed a period of unparalleled prosperity in a country that still possesses vast wealth and abundant resources. As a result of its duration and severity, the depression has shocked business, governmental and social agencies into commendable activity for the relief of human suffering and distress.

But, what is more significant for the future, it has also aroused an insistent demand for a searching analysis of the weak spots of the business and economic systems under which such a calamity was possible. It is an encouraging sign that men are beginning to question whether these recurring periods of boom and depression are not preventable; whether it is possible under better management to insure greater security to all classes of people who are willing to work; whether their faith in American achievement and standards of living can be preserved.

Evidence is multiplying that these questions can be answered in the affirmative; that this challenge to the American business and economic systems can be met in such a manner as to justify our confidence in them. Instead of regarding business depression as a storm to be weathered or a condition that must be endured and allowed to "work itself out," thinking men are beginning to look upon it as an economic plague that can be averted and wiped out by preventive measures. Sentiment is stirring in favor of doing something about it, heeding the warning of our latest experience and preparing actively to meet the issue it raises.

It is the responsibility of the business press to crystallize constructive policies and to encourage progressive leadership. Therefore, the McGraw-Hill Publishing Company desires to do its part in helping to clarify the situation and to stimulate thought and action. It believes in the philosophy of individual enterprise and cooperative effort on which American achievement has been based. And it has confidence in the ability of American management to recognize and adopt sound economic principles as a basis for constructive business policies. But it is equally certain that only by conscientious effort on the part of each business unit, large or small, can American business as a whole return to normal and pursue a steady course.

PLANNING IS ESSENTIAL for uninterrupted progress. To assist in such a program the McGraw-Hill Publishing Company offers through its publications the following principles and practical suggestions as a guide in formulating individual plans. They are not presented as a ready-made formula for success, but as a foundation on which business can be built with some protection from the shocks and dislocations that have plagued it.

TACOMA PUBLIC LIBRARY

GENERAL OBJECTIVES

The following general objectives are fundamental in planning sound business developments:

1. Maintenance of Established Standards of Living

The belief that there is danger of a general overproduction of wealth, that technical development necessarily involves unemployment, or that standards of living cannot be indefinitely increased is an economic fallacy. American business should not yield to it in any of the policies it pursues. Rather it must protect and preserve our economic standards and social traditions by maintaining high purchasing power and regularity of employment and dividend disbursements, based on more stabilized methods of management and financing made possible by long-term planning.

RECOMMENDATION: Conserve and add to the gains achieved in the past ten years through technical advance, improved forms of industrial organization and methods of management, and new devices for financing industrial and market expansion. Increase efficiency in the economic production and distribution of goods and services so as to facilitate their widest possible consumption and thereby raise the standard of living of the American people.

2. Stabilization of Future Business Growth

So long as there are wide fluctuations in business and in price levels, the gains to some groups are cancelled by losses to others and there is no net gain to the country as a whole. The interests of the speculative and creditor groups should be subordinated to the interests of those concerned with the production and distribution of goods and services. The latter should have a larger measure of leadership in business policy to insure sound and lasting prosperity.

This leadership can be exercised only by a more deliberate process of long term planning and organization for the direction and development of business operations. Such effort involves market analysis, sales control, product development, modernization of factory and office methods, foresight in purchasing, long-term financing of fixed capital requirements and a stimulated program of capital investment in 1931 for the restoration of business volume. All this must be supported by broader policies of coordination within the industry or trade, cooperation with labor and participation in the organized development of regional and national resources.

RECOMMENDATION: Direct individual and organized effort to check excessive and unbalanced industrial and financial expansion, and prevent wide changes in price levels. This will remove the incentive to speculative gain, avoid conflict of creditor and debtor groups, and promote confidence in long-term investment and borrowing. It will also encourage productive and commercial enterprise, maintain a steady increase in consumer purchasing power and stabilize business progress.

3. Promotion of International Business Cooperation

The world is economically interdependent. Though the United States is the dominant factor in world prosperity, she cannot maintain or increase her own prosperity indefinitely without sharing it with the world, nor can her business system survive unless, by sharing its benefits, the other nations of the world can preserve their faith in it. This calls for a more active policy of international cooperation on the part of American business to assist in the gradual reduction or removal of unnecessary trade barriers that interfere with the natural exchange of goods and services between peoples, the development of a more stabilized international mechanism for the movement of capital and control of credit, and the revision of war debts and reparations.

RECOMMENDATION: Support individual or organized effort to promote cooperation among business and financial interests of the United States and other countries, in order to facilitate the normal international movement of goods, services and capital, and thereby enhance economic stability at home and elevate standards of living abroad.

4. Encouragement of Private Initiative and Responsibility vs. Extension of Governmental Activity

American business should encourage self-government. It has already shifted enough of its responsibility and thereby yielded enough of its initiative to government and must stand its ground against further extension of governmental action in matters in which it can assume responsibility itself.

The essential function of government is to keep clear the field of economic activity for private business initiative and to assure a basis of fair and equal competition in domestic and foreign trade. It should refrain from competing with any kind of business itself. It should facilitate and encourage the development of necessary controls upon business through organized self government. It should safeguard the economic stability of the country by maintaining stability in its own fiscal and international policies. It should reduce to the minimum the number of laws affecting business.

RECOMMENDATION: Oppose governmental regulation, control or expenditure which tends to limit or weaken private individual initiative or cooperative effort, or to diminish the responsibility of the individual business concern or organized industry, for the accomplishment of the objectives stated above.

RESPONSIBILITY FOR ACTION

This course of action for (1) the maintenance and elevation of American standards of living, (2) the stable development of American business, (3) the promotion of international cooperation and (4) the restriction of governmental encroachment upon private initiative and cooperative effort cannot be carried out without the earnest participation of individuals and organized groups representing all types of business and industrial activity.

Upon the following major groups the main burden of responsibility rests:

A. Industrial and Business Management: A few thousand business concerns in this country employ the bulk of the wage-earners, originate most of the consumer income, and produce the chief part of the goods and services that determine the standard of living. Upon the management of these concerns therefore rests the main responsibility for action that will:

(1) Formulate long-term plans for research, production, distribution, purchasing and financing.

(2) Support cooperative effort through industrial, trade and commercial organizations.

(3) Maintain wage scales that permit a high standard of living and purchasing power.

(4) Maintain and equalize employment by adjustment of working hours.

(5) Establish a reserve to protect the security of employment in times of reduced production.

(6) Establish and maintain stable prices.

(7) Maintain reasonable, stable dividends, conserving surplus accumulated in periods of prosperity for such use in slack times.

B. Industrial, Trade and Commercial Organizations: The power of business units is multiplied and their leadership is strengthened by vigorous, intelligent and far-sighted trade organizations. Through them it is possible to carry the foregoing principles into action on an industry-wide basis, which is necessary to their realization in each industry as a whole and to the even balance among all industries requisite to stable progress. They should cooperate in:

(1) Collection of data on costs, stocks, production, potential productive capacity and market conditions.

(2) Interchange of credit information.

(3) Development of codes of practice.

(4) Establishment of standards of employment salaries and wages within the industry.

(5) Development of opportunities for stabilizing business.

(6) Study of market development.

(7) Economic development and use of natural resources.

C. Banking and Financial Institutions: Next to the will and intelligence of individual and organized business, the most important factor in achieving the four objectives of this platform is the understanding and cooperation of the banking system in checking excessive inflation in times of prosperity and excessive deflation in times of depression. In the exercise of this function, business itself may well expect banking and financial institutions to:

(1) Require business management to think in terms of long-time planning where financial assistance is provided.

(2) Encourage corporations to accumulate substantial reserves in good times to be used in slack times for development and dividends.

(3) Discourage the extension of excessive credit in periods of unusual prosperity and in like measure facilitate legitimate credit in times of stringency.

(4) Assist in the promotion of mergers where real benefits can be obtained but oppose the merging of corporations for stock selling purposes.

(5) Lead in the development of international financial cooperation.

D. Labor: Stability of industrial and business operations requires a sympathy by American workers with the policies expressed in this platform, and a willingness to cooperate in making them effective. Responsibility rests upon labor as well as upon management if the worker is to enjoy the benefits of our business system. To this end labor should actively support these principles:

(1) That increased wages are dependent upon increased efficiencies in production and distribution.

(2) That business must be conducted profitably if labor is to enjoy higher standards of living.

(3) That employers operating on a program of long-time planning provide the maximum stability of employment.

(4) That labor should demand of their leaders an understanding of sound business principles.

(5) That the welfare of labor will best be served by recourse to arbitration and the avoidance of industrial strife.

(6) That the development of international trade is essential to domestic prosperity.

(7) That the extension of governmental activity hampers business in assuming its social responsibilities.

E. Government: The essential function of government is to keep clear the field of economic activity for private business initiative and to assure a basis of fair and equal competition. It can best promote sound economic development through these policies:

(1) Refrain from competing with any kind of business itself.

(2) Encourage the development of the necessary control of business through self-government rather than by legislation.

(3) Safeguard the economic stability of the country by maintaining stability in its own fiscal and international policies

(4) Exercise the greatest economy in public expenditures.

(5) Reduce to a minimum the number of laws affecting business.

(6) Cooperate with foreign nations for the fullest development of international trade

AND IN CONCLUSION

THESE RECOMMENDATIONS can have value only as they are applied in the planning of individual company operations and in the programs of those industrial, commercial, financial and governmental agencies that are responsible for the conduct of our economic affairs. But taken broadly they constitute a platform of economic principles and business policies upon which far sighted management may well make a stand.

New conditions of our modern industrial civilization have laid new social responsibilities upon those men who guide the destinies of business enterprise. The protection of the welfare of workers and their security of employment and the assurance of permanent income to investors have become basic factors in the attitude of public opinion towards industry. And public opinion in the end has the power to preserve or to curtail that freedom of initiative around which the whole philosophy of American life has been organized.

Business management must meet the call of these responsibilities, therefore, if the people of the world are to be lifted out of the present depression and given assurance of greater stability of earning power in the future. Business leadership itself must strengthen and secure the success of this system of private initiative and cooperative effort upon which the prosperity of this country has been founded and of which it stands today as practically the sole exponent.

This proposed platform is being presented to American business through McGraw-Hill publications reaching into nearly every major industry in the country. It will be developed and interpreted editorially as a guide to the formulation of individual plans and business policies.

AS A FURTHER AID in that direction the reader will find within this supplement a check sheet of practical suggestions. Many of them are known to be practised by successful, well managed business concerns. It is believed that they will be of value and assistance to all American businessmen in planning for future progress and prosperity.

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A CHECK SHEET
of Practical Suggestions for Planning a Company Program

I—Long Term Planning of Business Operations

A. Definitely abandon the yearly period as the basis for business operations, except in accounting matters.

(1) Project business policies and planning, wherever possible, upon a three-year period or longer as a unit.

B. Initiate research from the customer's standpoint to determine:

Analyzing the Business

(1) To what extent established lines should be replaced, improved or simplified.
(2) What additional markets can profitably be penetrated with these lines.
(3) What new products can logically be added for present and new markets.

Appropriations made for this research should be distributed over a long enough period to carry the project through without interruptions. (Some companies charge such appropriations to capital account just as they do the cost of a patent or a new building.)

the project through without interruptions. (Some companies charge such appropriations to capital account just as they do the cost of a patent or a new building.)

Sales Control

C. Carry this long term planning into sales control, involving distribution methods, sales forecasting and pricing.

(1) Revise present methods of distribution and service to conform to the best interests of the customer. (*Example*—establishment of retail stores by mail order houses.)

(2) Prepare sales forecasts by products and by markets with regard to competition. (Leading institutions have found that modern sales forecasting can be correct within 2 to 3% for a year ahead and within 5 to 15% for three years ahead.)

(3) Know costs and stop selling at a loss. Maintain firm minimum prices based on production costs. (Business history shows a high degree of prosperity among those companies, large or small, which have had the courage to stand on a minimum price that insured a profit.)

(4) Plan sales organization, sales program and advertising on at least a three-year basis.

Production Modernization

D. Plan for uniform production as far ahead as possible on the basis of sales requirements already determined.

(1) Modernize and replace every existing production facility, including plants, factory and office equipment and methods where it is possible to effect cost reduction and greater production flexibility. (Stores, banks, and offices have a production problem no less than factories.)

(2) Do not expand production facilities in the mere hope for lower costs through larger production, but only where the long term forecast shows the necessity for additional facilities.

(3) Base purchase of materials, supplies and equipment upon the marketing and production program for the three-year period and make purchases as far ahead as practicable.

Financial Policies

E. Stabilize financing. Working capital requirements for labor and material, and business capital requirements for development and expansion, can be determined with reasonable accuracy for a period ahead by long term planning.

(1) Do not depend permanently upon bank credit for purposes other than short-term loans for current working capital. (In the interim partial payment financing of equipment, etc., is widely accepted as sound business practice.)

(2) Raise needed fixed capital requirements by bond or stock issues whenever reasonably advantageous.

(3) Invest surplus in short-term commercial paper or good bonds rather than employing it in call money or for purely speculative purposes.

Many of America's soundest corporations have adopted these financial policies.

II—Coordination with Industry or Trade

A. The success of long term planning for an individual business is multiplied and secured when similar policies are established throughout the industry.

(1) Aid in the establishment and share in the active development of an industry, trade or commercial organization—

(a) to collect data on costs, stocks, production, potential productive capacity and market conditions.

(b) to interchange credit information.

(c) to develop codes of practice.

(d) to take full advantage of legal trade cooperation.

(2) Cooperate to establish standards of employment, salaries and wages within your industry. (Labor is particularly susceptible to advantages offered by a business where long-term planning gives stable employment.)

III—Promotion of National Prosperity

A. The net profits of a modern business depend not only on its own activities but on sustained business stability throughout the country. There is a vital responsibility upon each business enterprise to do its share to provide national stability of purchasing power through —

Stabilization of National Purchasing Power

(1) A policy for employment.

(a) Establish a minimum payroll based on the planned program of production and sales and consider this minimum payroll as a fixed charge on the business. (*Example*—the Procter & Gamble plan.)

(b) Maintain a salary and wage scale that permits a high standard of living and thus of purchasing power.

(c) In slack periods, preserve the organization of trained personnel by reducing hours of work per man rather than reducing number of employees.

(d) Set up a reserve to protect the security of employment in times of reduced production.

(2) A policy for dividends.

(a) Resist the temptation to pay out excessive sums in dividends in boom times. Rather place excess earnings in reserve and do not hesitate to use this reserve in slack times to maintain national purchasing power through dividend disbursements. (*Example*—U. S. Steel Corp. policy.)

(3) A policy for 1931 expenditures.

Business cannot return to normal until there is put into circulation for one year an additional amount of money equivalent to approximately $300 per employed person over the amount spent in 1930. If individual business initiative is to assume the responsibility of returning the country to normal then each employer must accept his quota. Where the volume of business does not warrant this increase in the form of operating expenses, the money may be placed in capital expenditures—modernization, research for development, new patents, etc.

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B. Each business enterprise has a responsibility to aid in the development of regional and national resources.

Development of National Resources

(1) Encourage and cooperate in the coordination and promotion of the economic area in which you are located through constructive programs for the improvement of agricultural, commercial, industrial and community development. (*Example*—New England Council.)

(2) Assist in the work of national associations devoted to the improvement of business ethics, the promotion of higher standards in the commercial, industrial, financial and political administration of the country, and the simplification of the laws governing business. (*Example*—Chamber of Commerce of the United States.)

IV—Maintenance of World Business

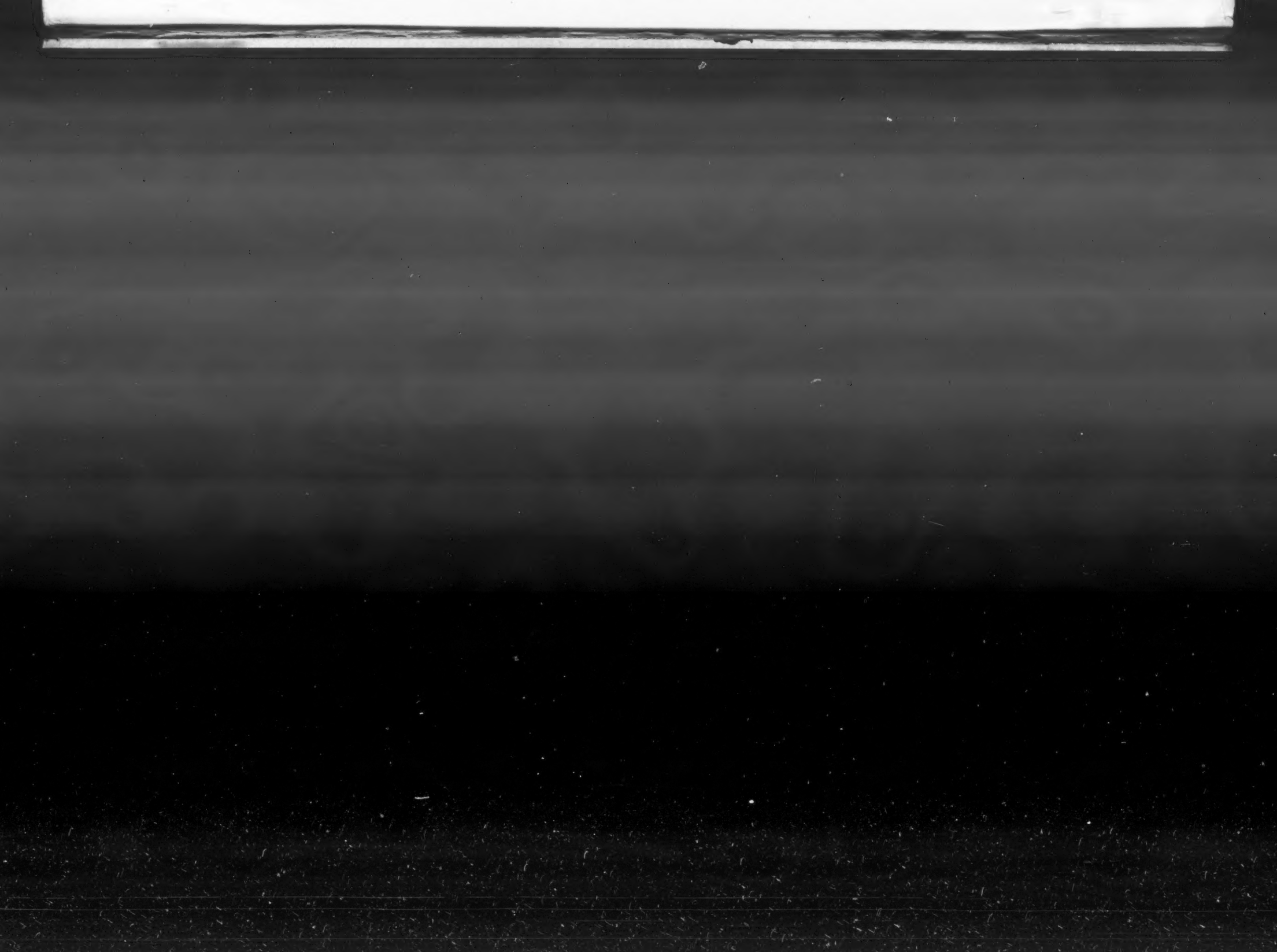
Probably the greatest potential market for present and future American products lies in that foreign field represented by the present difference between the living standards of the American public and those of a billion and a half people in many other countries. Any slight increase in the living standards of these vast populations will bring immediate benefits to American manufacturers, as the largest producers of those commodities contributing to labor saving and luxury.

A. Support cooperative studies and formulation of world policies among business interests through international business organizations on such subjects as—

International Business Cooperation

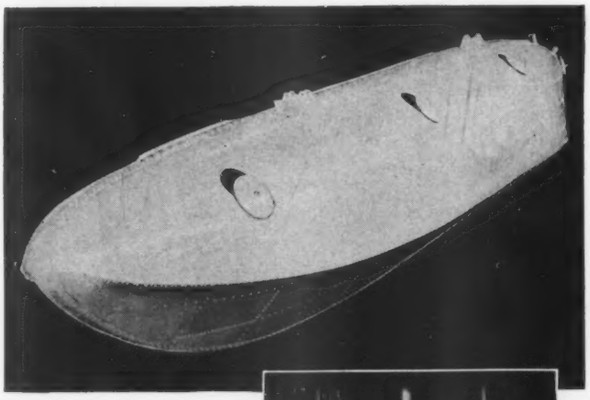
(1) World tariffs.
(2) Trade discriminations.
(3) International movement of capital.
(4) War debts and reparations.

B. Promote uniformity in foreign trade practice by encouraging coordination among organized industries.

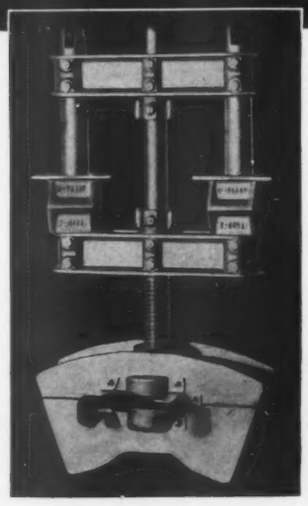


The P3M-1 Martin Flying Boat—Wing Span 100 *ft. Normal Gross Weight* 15,264 *lbs.*

BUILT TO SERVE THE NAVY WELL!



Special Martin processes give the anodically treated aluminum alloy floats of the P3M-1 maximum resistance to corrosion.



This easily adjusted Stabilizer Mechanism of the P3M-1 exemplifies Martin's traditional sturdy construction.

DESIGNED for either bombing or patrol service, this P3M-1 Martin Flying Boat embodies all of the notable features of Martin construction that have become almost a tradition with the Navy.

The finest of modern, all-metal construction. Remarkable resistance to corrosion. Accurate interchangeability of parts. Tanks and engine mounts that defy vibration. The utmost dependability in the air.

The Martin Company takes great pride in the confidence placed in its work by the Bureau of Aeronautics. In return, the efforts of the Martin organization are constantly applied to the task of producing better planes for Navy fliers.

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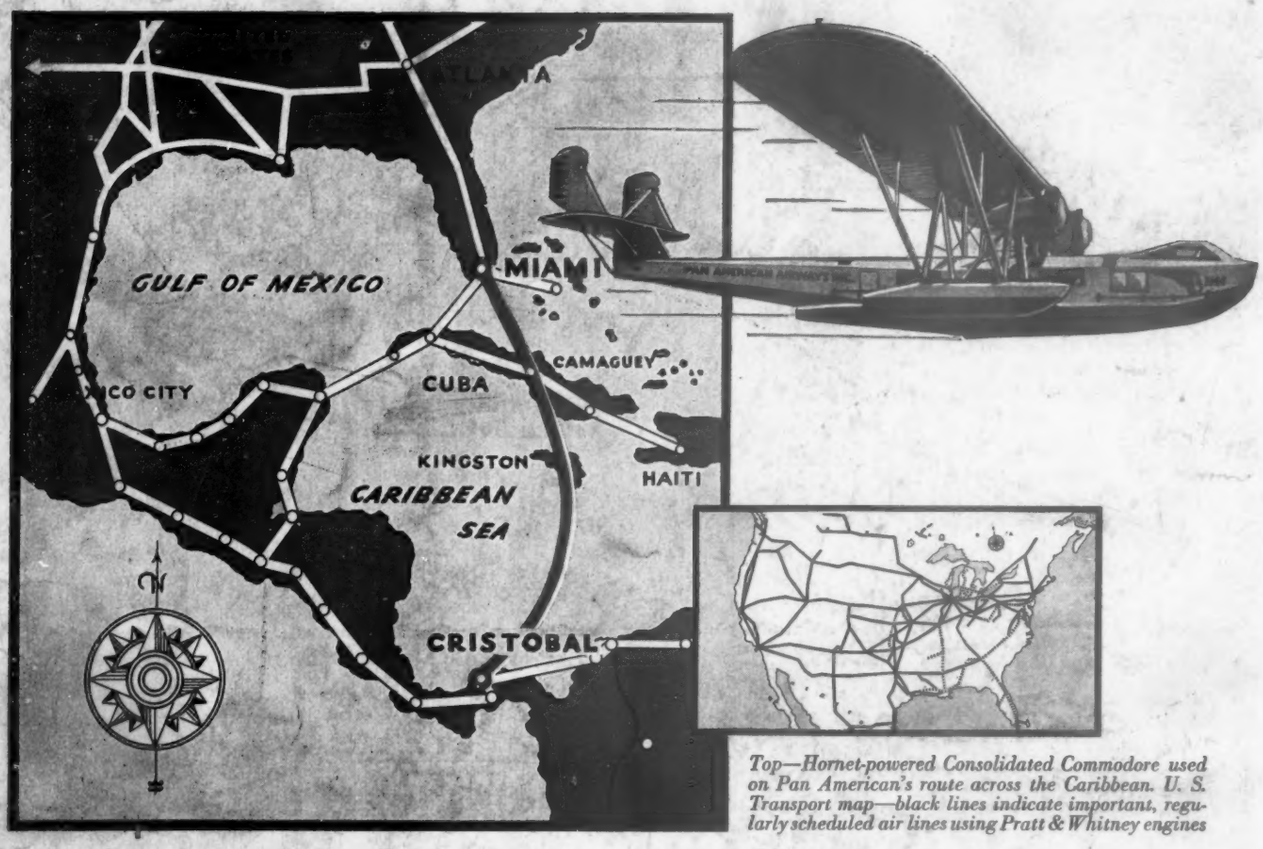

Top—Hornet-powered Consolidated Commodore used on Pan American's route across the Caribbean. U. S. Transport map—black lines indicate important, regularly scheduled air lines using Pratt & Whitney engines

PAN AMERICAN FLIES THE WORLD'S LONGEST OVER-WATER HOP WITH PRATT & WHITNEY ENGINES

Of the 1,385 air miles between Miami and Cristobal, 1,335 are over water. Between thirteen and fourteen hours of flying—and the planes of Pan American Airways make it regularly, carrying passengers and mail.

Here, on the world's longest regularly scheduled over-water route, engine reliability is of supreme importance. And the Pratt & Whitney "Hornets" used by Pan American are delivering steady, unfailing performance. So too, on approximately ninety per cent of the other regularly scheduled air transport lines of this country "Wasp" and "Hornet" engines are making air power dependability a matter of certainty.

★ *Pratt & Whitney engines will be on exhibit at booths 124-134, Detroit Aircraft Show.*

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